

## FOREWORD

As the SECDEF stated in his defining policy on this subject on 29 June 1994, "...Greater use of performance and commercial specifications and standards is one of the most important actions that DOD must take to ensure we are able to meet our military, economic, and policy objectives in the future" and "...one of the most difficult issues we face in reforming the acquisition process." These statements are as true today as they were then.

Performance specifications are at the heart of acquisition streamlining and reform. They permit greater contractor flexibility to develop innovative solutions and build in quality through process control and continuous process improvement. The government gets affordable, quality products and services from a strengthened national industrial base responsive to DOD needs. Use of performance specifications for systems and performance-based statements of work for services enhances competition and much needed force modernization.

For those who used this Pamphlet before, as well as those who might be reading it for the first time, it is well worth your time to digest the new and substantially revised material it contains. This Pamphlet reflects U.S. Army Materiel Command (AMC) policy, direction, and activity to execute the new DOD specification and standards management and performance-based services contracting policies since 29 June 1994. It provides significantly new guidance on the preparation and use of performance specifications. It shows the link between performance-based contracting concepts and the acquisition of technologically superior products and services at affordable costs while enhancing relationships with our industrial base partners.

Please submit suggestions for further refinements gained from your performance specification experience to the Principal Deputy for Acquisition, HQ USAMC.

Approved by:

GARY A. TULL  
Principal Deputy  
for Acquisition



**DEPARTMENT OF THE ARMY  
HEADQUARTERS, UNITED STATES ARMY MATERIEL COMMAND  
5001 EISENHOWER AVENUE, ALEXANDRIA, VA 22333-0001**

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**Procurement**

**GUIDE FOR THE PREPARATION AND  
USE OF PERFORMANCE SPECIFICATIONS**

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## CHAPTER 1

### CONCEPT AND BACKGROUND

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#### 1.1 PURPOSE AND OBJECTIVE

The purpose of this pamphlet is to help acquisition personnel, including requirements generators, specification developers, end-item users, and acquisition professionals, to think about and use essential operational, performance, and functional characteristics to create performance specifications for products and performance based statements of work for services. These approaches help streamline the acquisition process and acquire defense systems, equipment, and services at affordable costs that represent the best value.

The pamphlet's objective is to identify the types of technical and business issues to consider when preparing performance-based contracting documents. Because of the infinite variety of materiel and services purchased, it is not possible to offer guidance in this document on what every solicitation should include. Judgment and common sense are always necessary in preparing effective performance specifications and performance based statements of work.

Writing performance-based documents need not be difficult nor do they have to be long or complex. It does take an open mind and a different way of thinking. Thinking about the issues discussed in this Pamphlet will help in making wise decisions about creating and using effective performance-based contracting documents.

#### 1.2 BACKGROUND ENVIRONMENT

Primarily since WWII, Department of Defense (DOD) procured the vast majority of its materiel using Technical Data Packages (TDPs) containing Detailed Design Data (DDD). This DDD includes detailed military specifications and standards, manufacturing drawings, manufacturing processes, inspection procedures, test equipment and gage designs. In more recent years, in addition to the description of technical needs, many specifications include management tasking, data requests, and information more appropriate to other sections of the contract. Justification often offered for using Government-controlled TDP containing DDD is the need for strict product quality assurance, configuration control and part standardization for supportability, and competitive reprocurement.

This "build-to-print" philosophy gives precedence to the detailed design and its associated data over all other contractual documentation. It imposes a high level of technical and contract administrative activity from both the contractor

and the Government. Because it defines “requirements” in absolute terms of the drawings, it limits product improvement and cost reduction opportunities by offering little opportunity or incentive for the contractor to improve either the product or manufacturing processes.

The Carnegie Commission on Science, Technology and Government, in a May 1993 study, recommended “.....the Secretary of Defense undertake, with high priority, a radical reform of the defense acquisition system.” The Commission recommended a complete break with the existing system and creation of a new approach based on the best acquisition processes used by competitive corporations. Such a shift leads, over time, to integration of the defense industrial base with the commercial industrial base to create a competitive, responsive national industrial base. This integration brings major technological benefits to our national security and important competitive improvements in the entire supplier base.

Appendix A is the executive summary of the Commission's report, “New Thinking” and American Defense Technology: A Radical Reform for the Defense Acquisition System.” The Commission notes one of the most significant differences between the commercial and defense industrial bases is commercial industry’s widespread use of performance specifications instead of reliance on “build-to-print” commonly used in the defense acquisition.

Shortly after his confirmation as SECDEF, Dr. William J. Perry chartered a multiservice cross functional process action team (PAT) to “develop a specific and comprehensive plan of action to ensure maximum progress within the shortest period of time towards elimination of unnecessary military product and process standards and specifications.” The resulting PAT report in April 1994, “Blueprint for Change,” outlines a series of recommendations addressing all aspects of developing and applying military specifications and standards.

Appendix B is the report’s executive summary highlighting these recommendations. The SECDEF accepted the Military Specification and Standards PAT recommendations without exception and, on 29 June 1994, issued a DOD policy entitled “Specifications and Standards—A New Way of Doing Business.” This policy, in appendix C, mandated “use of performance and commercial specifications and standards in lieu of military specifications and standards, unless no practical alternative exists to meet the user’s needs.” It finally fulfilled the continuous stream of study recommendations on the subject over the years.



### 1.3 CONCEPT

Preparing a specification to reflect a true and accurate statement of the user's needs is key to a successful procurement. A user need is not the same as a characteristic of engineering performance. An example of the first would be “secure” (a function); an example of the second would be “solder, weld, or bolt” (specific methods of securing). A specification should explicitly define needs, preferably in terms of operational, performance, or functional parameters, including interface and interchangeability. A good specification fosters open and effective competition by being technically “open.”

A properly constructed performance specification centers on user needs instead of focusing on technical engineering parameters. It results in quality products at affordable procurement costs with greatly reduced oversight and contract administration burden. Contracting with a performance specification allows the contractor the freedom to incorporate desirable product enhancements and new technology insertion, and to reduce both direct and indirect production costs resulting from using more efficient manufacturing operations. The contractor, as partner and team member, creates and enjoys a competitive advantage that translates into enhanced combat capability and affordable defense for the taxpayer.

Use of performance specifications is not new or unique. Performance specifications have proven very successful and are in wide use in the commercial marketplace. The Army enjoys equal success but on a more limited basis. Recent examples include big systems like ATACMS BAT Block II to smaller but equally important products to the soldier like the Mounted Water Ration Heater (MWRH) and the Pork Chops in Jamaican Sauce Meal-Ready-To-Eat (MRE) that ‘cooks’ in the heated water. Performance specifications are applicable to every type of product and technology.

### 1.4 CONTRAST BETWEEN DETAILED DESIGN DATA TDP AND PERFORMANCE-SPECIFICATION TDP ACQUISITION

The following two figures illustrate the main difference between an acquisition strategy employing performance specifications and a DDD approach.

In the process shown in figure 1, the DDD of the TDP forms the basis of acquisition. Engineering-driven measures of merit become the prime issue. This approach may or may not meet user needs because it treats them as outside or disconnected issues. Ideally, these engineering parameters directly relate to user needs. Many times, delivered equipment or services meet engineering-driven acceptance criteria but do not satisfy the user’s real needs. The basis of contract award tends to be the lowest price technically acceptable proposal.

These circumstances encourage a low-ball buy-in, typically bringing with it a subsequent lack of attention to quality coupled to a “get well” strategy based on engineering change proposals (ECP) during production. Add in the overhead management costs previously discussed that, too often, are necessary given these other constraints, and the result, unfortunately, is defense at the cost of displaced scarce resources, at a premium price.

In the second example, shown in figure 2, the user’s needs are paramount and remain central throughout the acquisition. User needs always remain visible in the performance specification. This process works equally well for development and follow-on procurements. The four steps in this process are--

- The government initiates solicitation preparation by identifying in the specification a “zero-based scrub” of essential performance requirements reflecting the user’s needs. This initial step includes an in-depth dialogue among user representatives, the procuring activity, and all potential offerors. Tested techniques such as market research and analysis, industry days, draft requests for proposal (RFP), and pre-proposal conferences work well to ensure all parties involved completely understand the government requirements.

The government also identifies any particular areas of interest in performance improvements that an innovative offeror might propose. Proposal page limitations help convey to industry the government’s interest in seeing only proposal information necessary to substantiate an offeror’s ability to satisfy the government’s needs and help facilitate selection of the proposal representing the best value. The DDD can be released “For information use only” if available and specifically asked for. Doing so creates the opportunity for competitive offerors to propose innovative product performance, production efficiency, and technology insertion improvements.

- Working throughout the draft solicitation sequence and from the final solicitation, prospective offerors develop their own performance specifications which reflect the unique performance of the proposed solution with the corresponding technical approaches to satisfy the requirements expressed by the government. In addition, offerors are free to propose any product capabilities that go beyond the stated government requirements.

As a part of this process, offerors can suggest improvements to the DDD or specification along with any benefit to important government concerns such as reliability, logistic supportability, or environmental impairment. Included warranty provisions indicate the contractor’s willingness to stand behind the quality of the proposed solution.

- Through the source selection process, the government selects the proposal representing the best value through a comparative assessment of proposals against all source selection factors in the solicitation. These factors may include various cost or price and non-cost considerations such as life cycle cost, cost realism, price, operational capability, contractor past performance, product quality characteristics like reliability, availability, maintainability (RAM), integrated logistics supportability (ILS), and environmental management practices, rather than cost or price alone.

After selecting the proposal, the government effectively establishes a new Functional Baseline incorporating all of the improvements that were a part of the successful offeror's proposal. In this way, the specification of the selected contractor becomes the government's specification.

Reprocurement needs can then use the current contractor's specification as the basis, if such user assessments have indeed validated the desirability of accepting the proposed improvements.

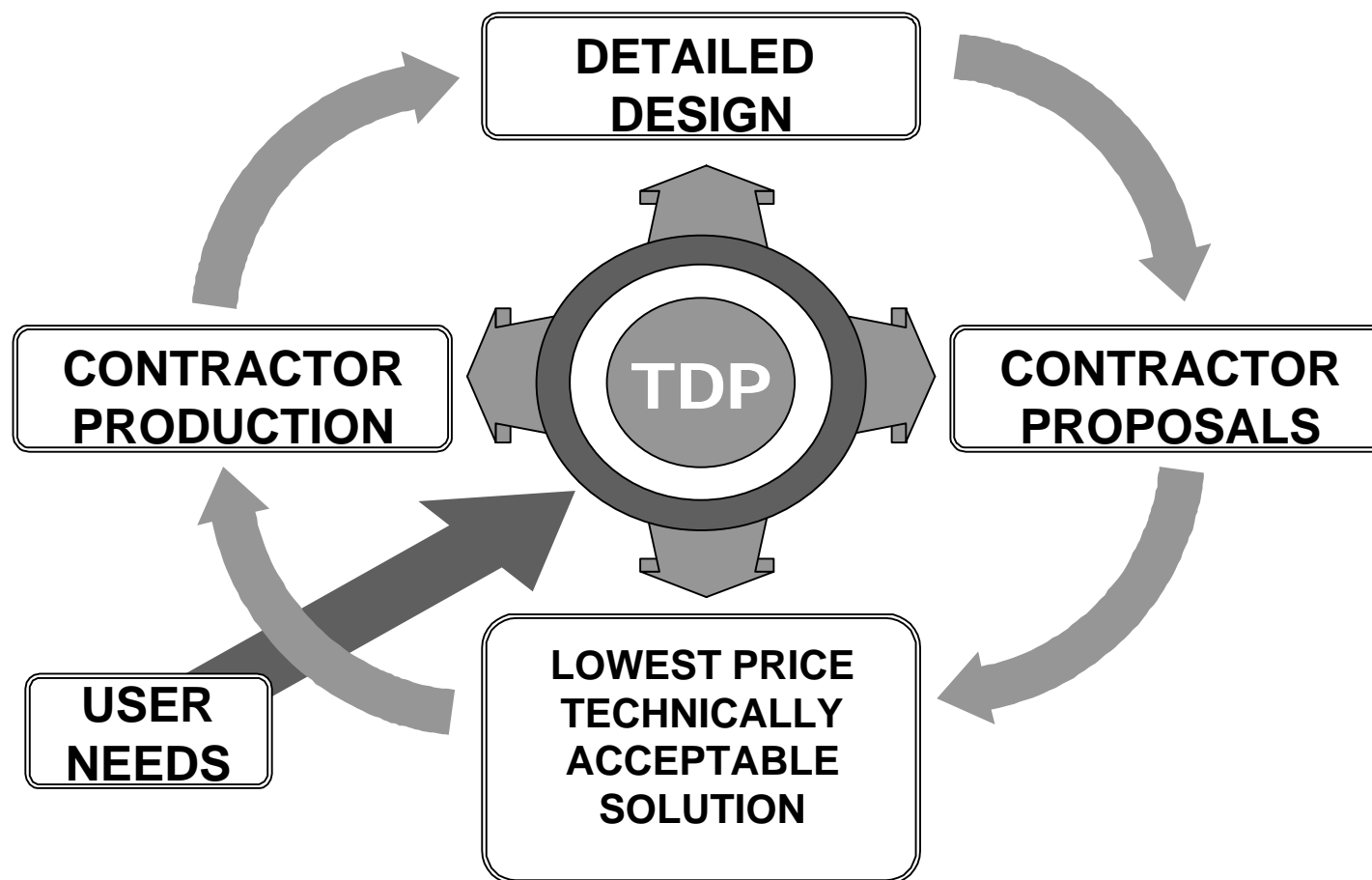
- Finally, during production and delivery, the contractor maintains configuration control over the detailed DDD for the item. The contractor produces the hardware from this DDD, performs necessary verification, provides Certificate of Conformance (as necessary), and warrants the product's performance against the performance specification agreed to contractually. The Government maintains configuration control over the top level performance requirements. The contractor does not have the right to unilaterally change any of the top level performance requirements identified in the specification since these performance requirements formed the basis for the selection of this specific contractor and product.

A competitive reprocurement uses basically the same cycle. In this case, however, the government prepares the solicitation, using the current contractor's performance specification (and drawings, if available but for information only) as the baseline. Otherwise, the process follows the same logic as before. As a result, the Government reaps the benefits from increasing technical capabilities and cost-reduction opportunities in the marketplace with each succeeding buy.

To ensure that logistics support for the item does not become unmanageable, interchangeability at the critical spare part level must receive careful consideration before execution. A good up-front operational level of repair analysis (LORA) (or mid-product-life analysis) supplemented with a failure modes effect and capability analysis (FMECA) on currently fielded items should

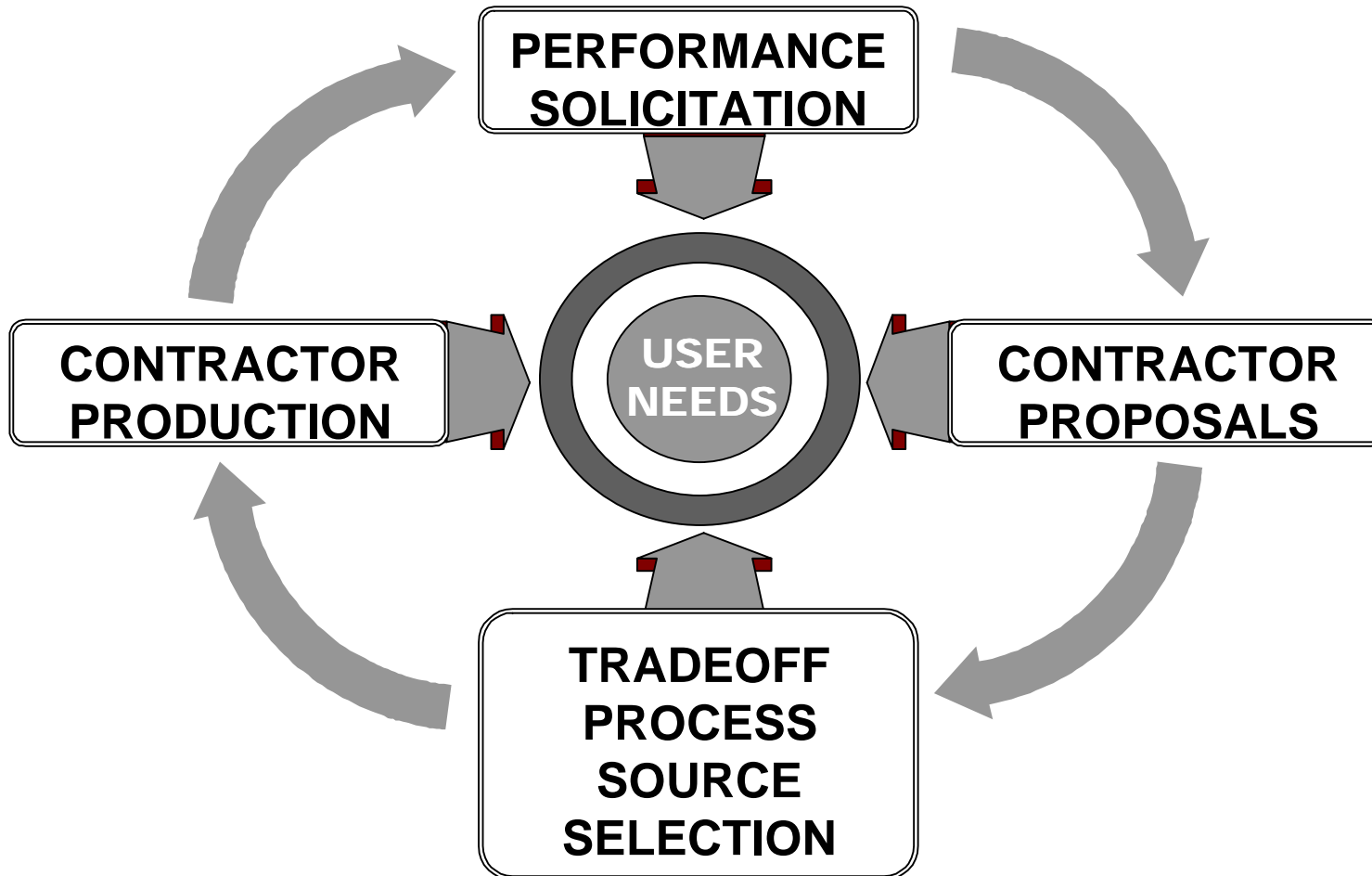
indicate when and where sparing at any specific component level makes “sense.” There may be no need to spare the part(s) in question at all. Repair should also be considered. Interchangeability of spare parts is fine for ‘repair by replacement’ but where actual repair is going to be required, DDD will have to be available and therefore, purchased from the contractor and maintained and controlled by the Government.

The government, using a performance-based approach to acquisition, derives the ability to procure materiel and services in a manner which is more analogous to the commercial community, where the best capability for the best price - becomes the basis for contract award and contractor longevity. Figure 3 depicts this concept. A process like this moves the government toward the goal of telling suppliers what it needs, not "how to do it." This process varies from the "traditional" method of developing and using detailed “how to ” specifications and statements of work in contracts. It is not impossible to accomplish but does require a cultural change to implement within the acquisition process.



**Figure 1. DETAIL-BASED ACQUISITION**

Driven By The Technical Engineering Requirements Of The TDP



**Figure 2. PERFORMANCE-BASED ACQUISITION**  
Centered On User Functional, Operational, and Performance Needs

## CHAPTER 2

### REFORM AND STREAMLINING PRINCIPLES

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#### 2.1 AMC ACQUISITION GOALS

AMC established the following primary goals as a way to define the required cultural shift necessary to meet Army acquisition commitments:

- Integrate the U.S. defense and commercial industrial sectors to achieve an efficient, national industrial base.
- Remove barriers preventing industry from making full use of commercial markets to support the defense.
- Produce the highest quality solicitations by reducing unique, unnecessary, and non-value-added government-imposed requirements.
- Ensure environmental concerns become an integral part of the acquisition cycle to ensure that DOD acquisition programs and production facilities are in compliance with applicable environmental and occupational health laws, both now and in the future.
- Select and award contracts to only the highest quality best value contractors.

Performance specifications and performance-based contracting is one of the central pillars in achieving the AMC acquisition goals.

#### 2.2 INTEGRATED ACQUISITION INITIATIVES WITHIN AMC

AMC has a series of ongoing acquisition reform and streamlining initiatives to improve the way it procures required materiel and services. Some of these initiatives, in addition to military specification and standards reform, include concepts such as buying on a commercial basis, eliminating non-value-added requirements, best value contracting, and greater use of contractor past performance evaluation in source selection.

The overall intent of these and other efforts is to procure quality materiel and services that meet the user's needs. Accomplishing this requires selecting quality contractors and giving them the flexibility and freedom in the design process to incorporate innovative approaches without being constrained by specification or contractual issues which limit that creative flexibility while adding no value to the final product. These initiatives might appear as if they are standalone efforts but they are very interrelated, as shown in figure 3.

### **2.2.1 BUYING ON A COMMERCIAL BASIS**

The commercial sector is where many advanced technologies are emerging, especially in the high-tech electronics field upon which defense so heavily relies. Commercial practice prefers performance specifications for this very reason. Less “waste” means more competitiveness. Performance specifications--

- Allow alternative and innovative solutions.
- Minimize resources and specification preparation effort.
- Minimize the impact of suppliers' marketing pressures.
- Reduce resources required by suppliers to prepare detailed proposals.
- Focus on performance results, not manufacturing characteristics.
- Allow design modification for obsolete or unavailable parts.
- Allow environmentally friendly design practices.

### **2.2.2 ELIMINATION OF NON-VALUE-ADDED REQUIREMENTS**

The first step in achieving a better specification (or any contract document) is the elimination of obvious non-value-added requirements. Simply put, what are the levied requirements on prospective contractors in any part of the RFP which are not essential to delivery of a product or service to satisfy the user's need? Any requirements scrub clearly must start with the specification which, directly or indirectly, may tell offerors "how to do it" or "what to do" and not describe what the user really needs. The tiered references in Section 2 and wholesale references in Sections 3 and 4 of the specification to detailed MIL-SPECs and STDs are obvious targets. Innocuous references or paragraphs in the SOW dealing with compliance with other MIL-SPECs, MIL-STDs, or other Government documents contain buried non-value-added requirements.

Other contract sections and the data request lists frequently contain more opportunities to uncover these non-value-added issues. Compliance with these unique requirements, including the administrative paperwork to "prove it," is the most significant discriminator between the cost differentials in government and commercial contracting. The AMC Functional Templates offers one effective process to review and challenge requirements in every aspect of an acquisition that appear excessive or do not add value to the Army if contractually imposed.



## Technological Superiority - On-time Delivery - Affordability

### **BE A WORLD-CLASS BUYER**

- USE PERFORMANCE AND NON-GOVERNMENT SPECIFICATIONS
  - ACHIEVE QUALITY THROUGH PROCESS CONTROL
  - ELIMINATE NON-VALUE ADDED REQUIREMENTS
    - MINIMIZE ENVIRONMENTAL HAZARDS
    - OPERATE WITH IPTs
  - REDUCE MANAGEMENT STRUCTURE
  - MAKE BEST VALUE SOURCE SELECTIONS
- STRIVE FOR CONTINUOUS PROCESS IMPROVEMENT
- INCREASE PERFORMANCE-BASED CONTRACTING

### **CREATE USER SATISFACTION**

### **HIRE A 'QUALITY' CONTRACTOR**

**Figure 3. ARMY ACQUISITION IMPROVEMENT INITIATIVES**  
Define Outcomes - Take Action - Measure Results



## **CHAPTER 3**

### **PRESENT SPECIFICATION PRACTICES AND POLICIES**

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#### **3.1 PAYING A PREMIUM FOR DEFENSE PRODUCTS AND SERVICES**

The lowest-priced, responsive, responsible offeror traditionally received the award in DOD competitive acquisitions in the past. In today's environment, the government usually weighs the added benefits offered against any added costs required to gain those benefits to determine the winner. Meeting the performance requirements is frequently a primary selection criterion. Therefore, it is essential that the specification(s) for the item or service are of the highest caliber. Unfortunately, past experience indicates there is a high probability that a good proportion of government specifications contain a number of significant flaws which increase acquisition cost with little or no added value.

It is noteworthy that over time DOD policies and guidelines for the preparation of specifications consistently emphasized the statement of requirements in performance or "what-is-necessary" terms as opposed to telling industry "how-to" design a product, operate an industrial process, or perform a service. Unfortunately, procuring agencies often overlooked or ignored these policies and guidelines, there was little or no enforcement of them, and there seemed to be little appreciation placed on the cost ramifications caused by this situation.

#### **3.2 TYPICAL SPECIFICATION PROBLEMS**

The primary function of a specification is to functionally describe a product or service to satisfy a particular need plus the criteria for verifying the delivered product or service that meets the requirement(s). The main problems that DOD experienced with specifications stem from the fact they have generally included--

- Specific design solution and material selection information.
- Specific manufacturing process and test equipment information.
- Management tasking and other direction related to the SOW.
- Duplicate Data requirements already specified in the CDRL.
- Information appropriate to other contract sections, like shipping instructions, packaging materials, transportation arrangements, delivery storage arrangements, and schedules.
- Multiple-tiered references (by inference if not by fact).

- Crash investigations, hazardous materiel handling, and environmental solutions required by other government regulations.

Including this detailed technical, managerial, and contractual direction in the specification violates the definitional intent of a specification. It also severely constrains industry from supplying anything other than what they are “told” to do, or be unresponsive to the solicitation or in violation of the contract.

### **3.3 SPECIFICATION POLICY AND GUIDANCE**

The principal guidance and direction in DOD for preparation of specifications and associated documents is DOD 4120.3-M, Defense Standardization Program Policies and Procedures, and Military Standard (MIL-STD) -961D, DOD Standard Practice for Defense Specifications, published 22 March 1995. This standard practice “performance” document is a complete rewrite from the -C version. It contains the philosophy and prescribed the format for writing system-unique as well as component-type performance specifications.

SD-15, Performance Specification Guide, published 29 June 1995, supplements MIL-STD-961D with additional guidance and recommendations on how to write and use performance specifications. MIL-STD-961D, Appendix A supersedes MIL-STD-490A and incorporates new guidance on the writing of system-unique specifications. All these documents reflect Dr. Perry's 29 June 1994 policy fundamentally changing the way DOD acquisition organizations use specifications to procure goods and services for defense.

### **3.4 HOW “HOW TO” SPECIFICATIONS FIT IN**

One of the greatest misconceptions about the DOD policy on specifications revolves around detailed or MIL-SPECs. The policy did not outlaw this type of specification as many individuals assume. The policy only reversed the order of preference, making performance specifications the first specification of choice. Using detailed or MIL-SPECs is still an option when “no practical alternative exists to meet the user's needs,” but only with a justifiable waiver.

### **3.5 DETAILED DESIGN TDPs AND PERFORMANCE BASED TDPs**

Another issue that draws intense emotional reaction in discussions about using performance specification involves misunderstanding TDPs. A TDP is a package of the necessary technical information required for the production and delivery of an acceptable product. The argument against using performance specifications (performance based TDPs) is generally derived from the myth that the performance specifications would not attain:

- Product supportability because interchangeable parts would be unattainable.
- Competitive re-procurement for spares, replenishments, and re-buys.

These arguments are not valid. Classic elements of a detailed design data TDP--product drawings, manufacturing processes, materials, inspection procedures, and test equipment and gages, and so on—still remain present. If absolutely necessary the government can purchase the right to use the data. A manufacturer cannot take a performance specification to the factory floor and instruct a worker to make a part. A detailed drawing and other industrial information must exist for that to happen.

What make it difference is the contractor, instead of the government, manages configuration control over those detailed specifications defining the product, including those that define materials and processes used to manufacture the product. The government gives the contractor authority to make any changes to the detailed specifications as long as the changes do not affect any overall performance requirements (form, fit, function, and essential interface and interchangeability characteristics) defined in the performance specification. The government can compete with other contractors for the product, or any part of it down to single piece of the parts or components, by purchasing the data rights to do so, just as it has always done.

One of the more obvious impacts of the government no longer managing the bulk of its acquisitions based on detailed design data TDPs is the immediate effect on the traditional “build-to-print” contractors. These contractors will no longer be able to directly bid on government solicitations unless they possess adequate design engineering capability to do so. As discussed above, a “factory floor” cannot respond to a performance specification. The manufacturing process must have detailed product drawings developed, materials identified, and production methods and processes applied. Performance specifications have none of these. The “build-to-print” houses will bid to, or team with, “prime” contractors who do possess the engineering expertise to develop and manage these lower level, detailed specifications.

This is not an issue of cutting out the little guy from participating in defense contracting just for the sake of doing so. The government can no longer afford or effectively maintain its DDD TDP, the most expensive aspect of acquisition management, for everything it buys. It already owns millions of outdated DDD it cannot maintain. Adding insult to injury, this DDD contains requirements for obsolete components and material that require redesign and re-qualification in order to support continued procurement. This places the government in the position of special ordering these obsolete materials and paying a special cost premium for them. Trading off managing at the minutia level for performance-

based management results in improved products, modernized technology insertion, and affordable prices from a responsive national industrial base, with far less expenditure of government management resources.

### **3.6 “MANDATE FOR CHANGE”**

In the white paper entitled “Mandate for Change” submitted to Congress as part of his confirmation hearing on 9 February 1994, Dr. Perry concluded, “Removing requirements that are uniquely imposed on federal contractors is the single most important step DOD, the Administration, and Congress can take to help defense contractors compete successfully in today’s global marketplace.”

A focus on performance specifications is not the sole answer to all the ills of the acquisition process. Rather, the solution lies in using performance specifications as a central but integrated part of an overall reform and streamlining of the DOD acquisition process. The primary change necessary is one of emphasis, from predominant use of detailed specifications to greater use and reliance on performance specifications. A change in emphasis will benefit users, the DOD and suppliers. Users will benefit from having new technologies and combat capabilities available to them, DOD will benefit from increased competition bringing reduced purchasing costs, and suppliers will benefit from having greater access to government purchasing.

## CHAPTER 4

### DEFINING REQUIREMENTS

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#### 4.1 IDENTIFYING AND DEFINING USER NEEDS

The problem of unique military systems does not begin with military specifications or standards. The root of the problem goes all the way back to the requirements determination phase of the acquisition cycle. All services have processes dealing with the responsibility of combat development organizations to determine warfighting requirements. This poses an intriguing question if the objective of the materiel development process is to deliver an affordable, operationally effective, and suitable system to satisfy the identified need of the operational user. What is the difference between “needs” versus “requirements”? Even though this appears to be an innocent question, it has significant importance in any discussion about changing the emphasis and culture from detail-oriented to performance-oriented acquisition.

The typical combat member rightfully has many “wants” to ensure survival and mission accomplishment. However, as the new TRADOC P 71-9, Requirements Determination, states up front, “The Army can no longer expect performance at any cost or everything it wants.” In other words, the Army does not have the luxury to require “wants” or even state requirements in solution-specific terms. A more accurate question is “What does the combat member functionally need to perform the assigned operational mission.” A simple example illustrates needs versus requirements.

A “light, highly mobile, self-powered, tactical vehicle” describes a functional “need” for transportation of personnel or light cargo. An “AM General HMMWV” is a design solution to that need. Notice, no HMMWV, no MIL-SPEC or STD, no detailed drawings or other DDD exists. Combined into the specific solution called HMMWV, these details do prove one way to successfully satisfy the functional need. There could be, and probably are, many others. Remember, the user may want but does not need a specific design solution. The user only has a functional need that requires satisfaction. Keep this important distinction in mind when developing performance specifications.

Because the user is the ultimate beneficiary of procurement, it's both reasonable and appropriate that the user define the materiel needs. Historically, the user defines these needs through a Materiel Need Statement (MNS), a Joint Required Operational Capability (JROC) or Joint Statement of Operational Requirements (JSOR), Operational Requirements Document (ORD), or similar document. The user must state the needs in the materiel requirements documents in such a way they do not unnecessarily prevent the materiel developer from pursuing the most cost-effective solution available. The

acquisition agency then translates this information into a procurement specification.

## **4.2 MARKET RESEARCH AND ANALYSIS**

Market research and analysis means collecting and analyzing information about the capabilities of the marketplace to satisfy identified user needs or requirements. The technical community is primarily responsible for this function. Successful use of these tools rely on an early and continuous involvement with the marketplace. The process helps create a 2-way, open, and interactive communication link between the buying activity and industry suppliers.

Market research and analysis is necessary to gather and understand such issues as:

- the status and complexity of current technologies
- supplier capabilities
- product acceptability
- product cost or price ranges
- schedule availability
- normal contract terms and conditions.

A good technique to start is sending a draft of the performance specification out for review and comment to refine the specification. A thorough market research and analysis effort helps shorten acquisition cycle time, avoid unnecessary causes of non-value-added costs, and eliminate excessively complex or unnecessary requirements. It facilitates industry responsiveness to the subsequent solicitation package containing the final performance specification.

## **4.3 DEVELOPING PERFORMANCE REQUIREMENTS**

In developing performance requirements, describe only those aspects of the need essential for a supplier to provide the user with a viable, practical, and affordable solution. By articulating the needs in terms of output-oriented, measurable, operational, functional, and performance capabilities and characteristics, they will remain traceable throughout the systems engineering allocation, design, manufacturing, and verification functions that occur as part of the acquisition process. The following areas represent typical domains from which user needs generally emanate:

- Range.
- Speed.
- Power.



- Envelop (size).
- Efficiency.
- Accuracy.
- Payload.
- Safety.
- Durability.
- Acoustics.
- Environmental conditions.
- NBC effects.
- RAM.
- Interchangeability
- Supportability.
- Transportability
- Electromagnetic effects.
- Systems, procedural, and support equipment or facility interface.
- C<sup>4</sup>I architecture interface, protocol commonality, and interoperability.
- Human factor integration (MANPRINT).

Once defined, baselining and freezing these requirements is critical. An acquisition strategy using performance specifications based on unstable or floating requirements offers little improvement over the current environment. In actuality, needs based on performance requirements are easier to express and remain much more stable over time than requirements based on the details of a presupposed solution. As discussed, performance specifications reflect the outgrowth of the user's stated needs. They expand upon the user's needs by expressing them in terms of characteristics against which prospective offerors can propose. Doing so allows prospective offerors a way to calculate whether their products can satisfy the performance requirements. Contractors then have a realistic basis on which to formulate and submit proposals for consideration.

#### **4.4 LEVEL OF SPECIFICATION DEVELOPMENT AND CONTROL**

One of the largest areas of confusion and uncertainty on the part of specification writers in the development of performance specifications revolves around the question "how low to go for control of the product?" Each case is different. The guiding rule is the characteristics of the item should be definable by its own operational, functional, or performance characteristics. For example, it is possible to write a performance specification for an engine powering a tank or helicopter. It is also possible to write a performance specification for the shaft connecting the engine to the appropriate vehicle. The shaft is definable in terms of dimensional envelope, power transmission requirements, durability, torque, fatigue life, interfaces, and so forth.

Many of these interfaces are easily identifiable since the prime supplier could very well buy the item from a vendor using a performance specification. Other

examples include landing gear, auxiliary power units. Once the prime system manufacturer defines the needs to meet the system performance requirements, vendors with specific landing gear, auxiliary power unit (APU), or generator expertise design and develop the subsystem or component items to meet the flowed-down requirements. The government uses a similar approach when it provides engines as Government Furnished Equipment (GFE) to the prime contractor against a defined interface. For all intents and purposes, this is the same as a performance specification from the system integrator's point of view.

As a rule, the government should define its needs at the highest possible level. The basis for defining needs at lower levels should be only when necessary and where the definitions for desired performance at the lower level are in clear and unambiguous terms. Industry, on the other hand, takes these performance requirements, allocates and synthesizes them through the systems engineering process into detailed design, material, and fabrication specifications for a product which will meet the customer's stated needs. This means the contractor must exercise control at the lowest possible level. Figure 4 depicts this government/contractor interface when using performance specifications.

Unlike the past where the government maintained control over the entire performance-to-detail spectrum of specifications, the government now relinquishes direct responsibility and control over the detailed specification levels to the contractor under a performance-based acquisition approach. The ability of products to meet the operational, functional, and performance needs stated in the performance specification still has primacy and determines the adequacy and quality of delivered products.

#### **4.5 ACQUISITION STRATEGIES**

The government uses performance specifications for--

- Initial procurement of items being developed for the government to meet specific needs for which no readily available commercial item is satisfactory.
- Reprocurement of items for systems already fielded using a performance specification for the first time. In this situation, the current detailed design becomes the informational basis from which potential offerors start. This requires the procuring activity to clearly enunciate only the user's essential needs in the solicitation.
- Procurement of commercial or non-developmental products to meet user's defined needs. Engineering effort is usually borne by the potential contractor. In this approach offerors propose designs meeting the user's stated critical needs and offer competitive improvements (as possible).

Because of the continued decline in defense budgets, new program starts will become a rarity. For this reason, the most obvious applications of performance specifications will be for legacy systems. Use of the second and third strategies delineated above will be the norm. They offer the greatest opportunity for economic benefit to the Army.

#### **4.6 LESSONS LEARNED FROM AN EARLY EXAMPLE**

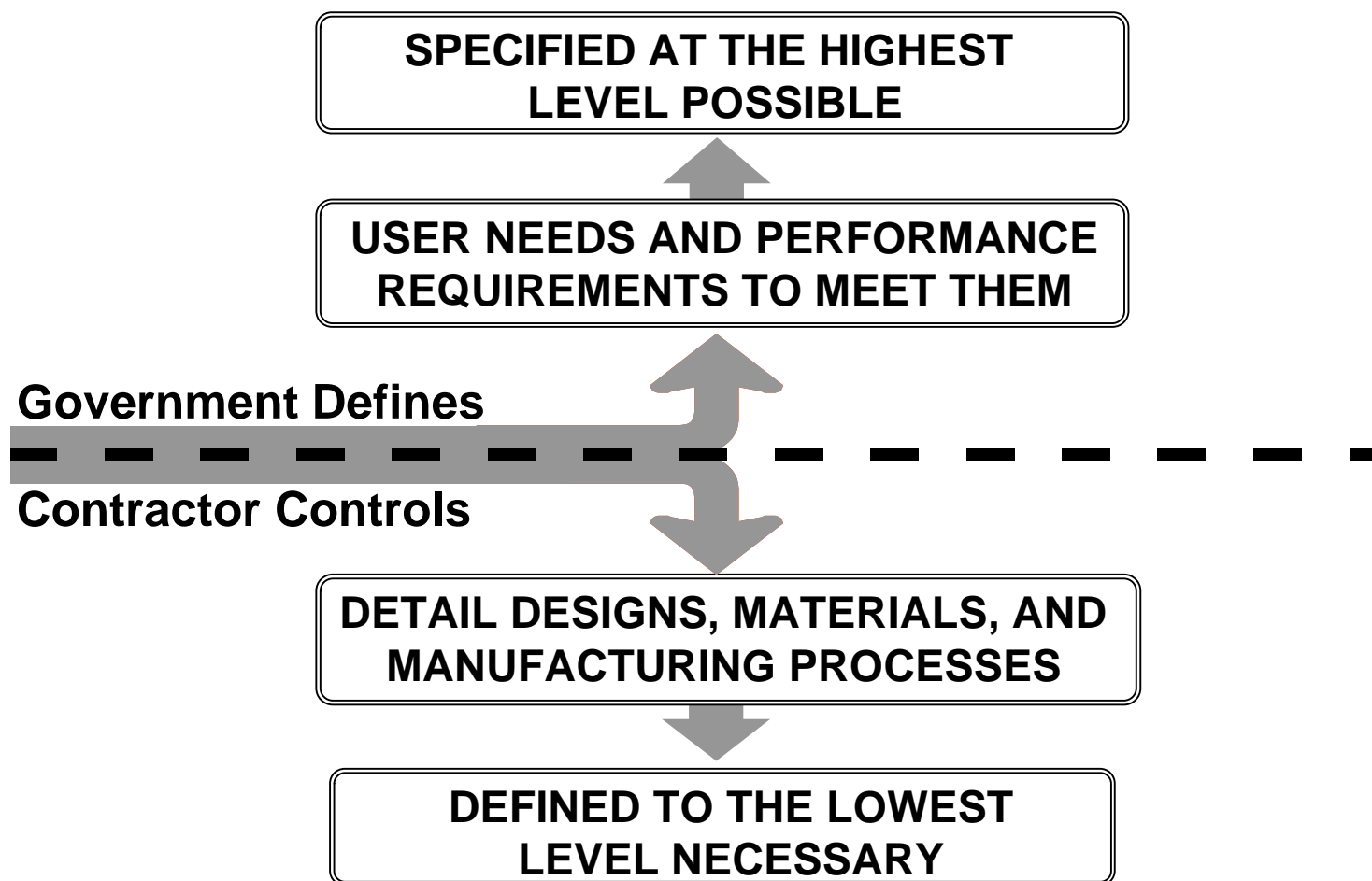
An old and often cited example of a "performance specification" is the original "Signal Corps Specification No. 486" for procurement of the first "aeroplane" by the Army Signal Corps. Appendix D contains the actual announcement for Specification No. 486. This document was just a few pages long but it identified the major issues important to the buyer. The Wright Brothers won the contract, awarded about 2 months after the announcement, at a cost of \$25,000.

Some tout this specification as an example of the way it should be done today. However, this "specification" is a mixture of sources sought, solicitation conditions, performance and functional characteristics, including test and acceptance procedures, management directive, data requirements, tender clauses, and contractual provisions. Most of today's detailed MIL-SPECs contain remarkably the same kinds of diverse contractual information in a document meant to describe product technical descriptions.

In many ways, this ancient specification was a precursor of today's problems with MIL SPECs and STDs. Even though this "streamlined" document contains some fine examples of performance requirements, it also contains the seeds of uncertainty and contracting peril DOD still struggles with today. For example, the specification states the flying machine "should be capable" of being assembled and put in operating condition in about 1 hour, operate in "any country which may be encountered in field service, " be operated by "an intelligent man" in a "reasonable period of time," and a few others.

Poorly defined requirements like these cause both the contractor and the government to expend a significant amount of time wrestling with compliance issues on the open-ended items that lack adequate definition of either the characteristics, their relative importance, or a way to validate them. This situation only opens the way for continued contract disputes.





**Figure 4. GOVERNMENT/CONTRACTOR INTERFACE**  
Complementary But Different Configuration Management Responsibilities



## CHAPTER 5

### DEVELOPING PERFORMANCE SPECIFICATIONS

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#### 5.1 CATEGORIES OF DOD SPECIFICATIONS

DOD recognizes six basic types of specifications listed here with the preparation guidance for each. These are--

- Component Specifications - MIL-STD-961D.
- Program-Unique Specifications - MIL-STD-961D, Appendix A.
  - System.
  - Item.
  - Software.
  - Process.
  - Material.
- Guide Specifications - DOD-4120.3M.
- Government (Other than DOD) Specifications - Applicable Agency Directives, DOD-4120.3M, and GSA Handbook FPMR 101-29.
- Commercial Item Descriptions - DOD-4120.3M and GSA Handbook FPMR 101-29.
- Non-government (Commercial) Specifications - Applicable National or International Technical, Professional, or Industry Standards Body (NGSB).

DOD component specifications may be either performance (identified PRF) or detailed (identified DTL). DOD program-unique specifications may be either performance or detailed depending upon approval. If approved for functional or allocated baselines, they are PRF. If approved for the product baseline, they are DTL. Normally, process and material specifications are always DTL. Guide Specifications are, by nature, PRF. They are not appropriate for reprourement, or for items, components, or materials. Other government agency specifications, including Federal Specifications, are automatically DTL unless specifically identified otherwise.

#### 5.2 SPECIFICATION FORMAT

The most common and frequently used specifications in DOD acquisition are the program-unique and the component specifications. Both these type specifications follow a six-section format. The format sections are--

- 1. Scope.
- 2. Applicable Documents.
- 3. Requirements.
- 4. Verification.

- 5. Packaging.
- 6. Notes.

### **5.3 PERFORMANCE SPECIFICATION EXAMPLES**

Appendix E contains an example of a component performance specification. Appendix F contains an example of a program-unique performance specification.

### **5.4 WHAT GOES IN AND WHAT DOES NOT**

Excluding unnecessary information is as important to preparing an effective specification as is including relevant information. Once again, the purpose of a specification is to describe product performance requirements. Do not include in a specification any extraneous managerial, data, solicitation, or other acquisition issues more appropriately placed elsewhere in the contract. Early discussion of the requirement with other members of the acquisition team should minimize the problems about what goes in a specification and what does not. Normally, exclude the following information from a specification:

- Design information (except for critical interchangeability or interfaces), especially that which reflect specific characteristics of presupposed solutions or shortfalls in existing systems.
- Material properties or information (except those critical to performance or function).
- Manufacturing processes, equipment, or facilities.
- Unrelated business information, in particular: management tasks, request for data or data rights, materials disposition, meeting schedules or agenda, financial (cost or price) data, delivery schedules, warranty provisions or Certificate of Conformance procedures, legal issues, security provisions, and managerial responsibilities, duties or obligations.

With all this apparent emphasis on what not to put into performance specifications, one very important thing to remember to put in is “Good Writing.” First and foremost, the specification, as all contract documents, is a communications device. It must state the operational, functional, and performance technical requirements as clear, concise, and precise as possible. Some simple rules to follow to achieve this objective are--



- Focus on what is needed, not how to do it.
- Use active voice style for clarity, not passive voice which obscures.
- Use clear, concise “plain” English, not “engineering-ese” or jargon.
- Be precise, not vague or open to interpretation.
- Give criteria output measures, not input measures (except for interfaces).

This last item is extremely important in helping set up a successful contract administration climate. Performance specifications must reflect mutually understood, objective or quantifiable requirements or severe proposal evaluation and contract enforcement problems will result. Appendix G contains some performance specification writing guidelines and a review checklist based on MIL-STD-961D policy and principles. Specification writers and users can compare the document they are developing or using to see if it meets the intent of DOD specification and standards reform.



## **CHAPTER 6**

### **USE OF PERFORMANCE SPECIFICATIONS IN ACQUISITION**

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#### **6.1 LINKING PERFORMANCE SPECIFICATION TO A FULL SOLICITATION PACKAGE**

Because this pamphlet concerns itself with the use as well as the preparation of performance specifications, it requires a wider field of view than just the specification itself. The way the government contractually uses a performance specification to procure deliverable products equals the importance of properly preparing the performance specification.

#### **6.2 KEY ACQUISITION MANAGEMENT PRINCIPLES**

These key principles are--

- Define essential requirements in the performance specification based on a clear articulation of the user's needs rather than detailed DDD. This makes the performance specification the top-level requirements control document, taking precedence over drawing packages when provided for general information only. Allow the user to play a key role in the development of the performance specification.
- Supplement the performance specification with drawings or process control specifications if such added information is essential to fully define the item being procured.
- Clearly address the applicability of performance specifications in all acquisition strategies and acquisition plans.
- Challenge and eliminate non-value-added functional management requirements to create a favorable post contract award management environment. Identify added value "targets of opportunity" for industry to pursue in their proposal.
- Evaluate contractor past performance (and not just past performance on government contracts) in all source selection processes, placing significant weight on this important factor.
- Vest configuration management and control to the contractor as long as the performance specification remains unchanged. When appropriate,

include options in the contract for verification and delivery at conclusion of the contract for contractor spare and repair parts performance specifications and technical data.

- Arrange for the government's right to buy spares and repair parts, if necessary, using the contractor's detailed drawing package or against the same criteria the contractor uses to procure vended hardware. This approach maintains compliance with competition requirements.
- Accept products on Certificates of Conformance (COC) backed up with strong warranty or performance guarantee provisions to the maximum extent practical rather than using detailed inspection and acceptance procedures. If applicable, Waive First Article Test (FAT) or qualification testing for contractors with verifiable history of good quality or those with products on a Qualified Manufacturers or Products List (QML or QPL). Eliminate repeated conformance testing, using instead, process capability or performance assessments to verify product quality.

### **6.3 EXCEPTIONS**

While performance specifications offer a highly effective technique to achieve significant benefits in the overall acquisition process, there are some occasions where performance specifications are not appropriate or cost-effective. These situations typically involve procurements for--

- Basic materials (i.e., sheet steel, red phosphorous), where commercial or industry standards already define what is available in the marketplace.
- Civil engineering construction projects because of the unique commercial practices already embedded in this type of acquisition.
- Nuclear propulsion, by policy and practicality, because the government controls all design and manufacturing aspects of this technology so there is no commercial segment to this market.
- One-time, low-dollar spare parts purchases where the effort to define a performance specification outweighs its limited use and direct purchase with a government credit card is more economically reasonable.
- One-time, very small lot purchases where the effort to develop a performance specification outweighs its limited use.

## **6.4 SMALL QUANTITY/LOW DOLLAR PURCHASES**

Since most procuring activities already have DDD and use them for reprourement, the question between continued detailed design TDP use or performance based TDP comes down to a tradeoff between the cost of DDD conversion and the benefits of reducing unit cost and avoiding technological obsolescence.

Some cases involving one-time low dollar or low quantity purchases may result in increased costs to convert to a performance specification. Examples of added costs include the conversion or rewriting effort, the addition of design engineering expertise for build-to-print companies, and increased proposal analysis costs of the Government because industry no longer bids to a standard Invitation for Bid on a fixed product.

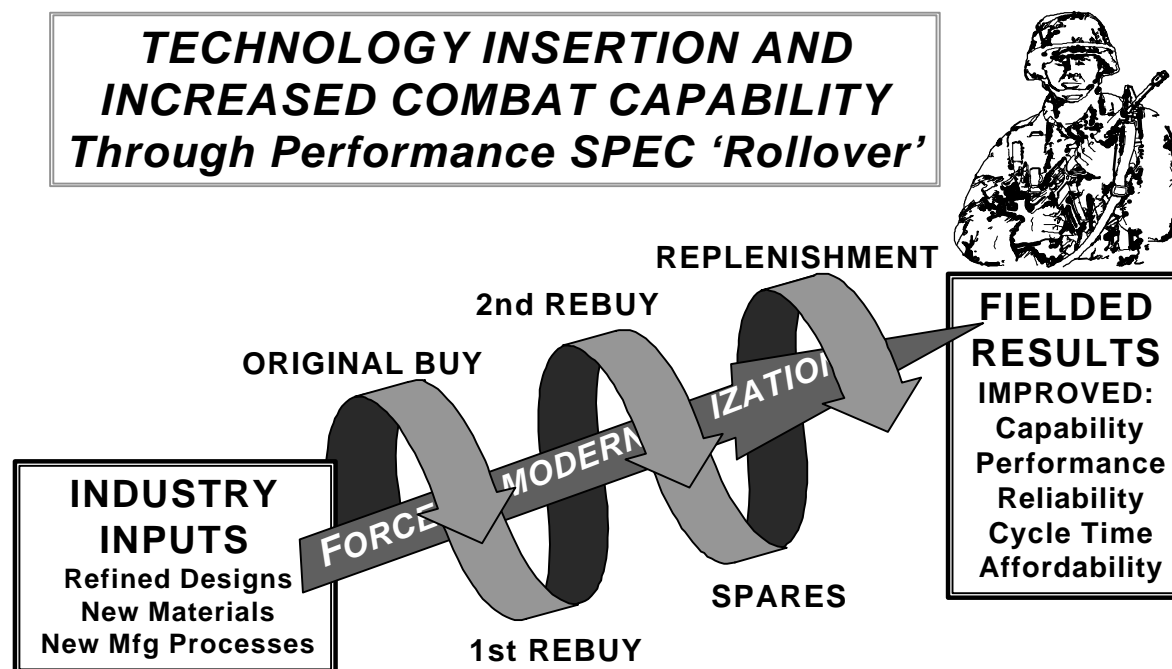
Keep in mind, however, two ways available to the government to avoid the pitfall of “having” to use TDPs under these circumstances. The government can use credit cards in those true instances of one-time or infrequent small dollar purchases. The government can also use a commercial item description (CID) if commercial products, even complex ones, exist that can meet the user’s functional requirement with little or no modification.

## **6.5 MANAGEMENT IMPACT OF PERFORMANCE SPECIFICATIONS**

A performance specification approach to acquisition represents a basic departure from today's predominant "built-to-print" environment. It requires identification of essential user needs for an item along with areas of desirable improvements. It places the responsibility for these improvements, including any design and development effort, squarely on industry where it should belong.

Such proposed improvements become a way to distinguish “best value” in source selections. As a result, performance-based acquisition is not just a process for the continuing reprourement of the same item. Performance-based acquisition offers the government a way to capitalize on technical innovation and technology insertion. The result is procurement of products and services for defense at continually improving levels of performance, quality, and affordability. Some refer to this process as “modernization from the inside out.” Figure 5 shows the dynamics of how this process works.





**Figure 5. MODERNIZATION**  
From 'The Inside Out'

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## CHAPTER 7

### CONFIGURATION AND LOGISTICS SUPPORT ISSUES

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#### 7.1 CONFIGURATION MANAGEMENT AND CONTROL

Historically, the government has assumed configuration management (CM) control after a Physical Configuration Audits (PCA) and first article testing was completed or the first production run was completed. The government allows a fair degree of latitude for change in system design or maintaining general oversight mainly through design review and approval cycles. When the Government assumes full configuration control of the TDP, it assumes control over changes, limiting a contractor's ability to implement any Class I-type (form, fit, or function) change. The contractor now has no control over the design, nor any ability to change it without going through an often time-consuming process filled with multiple internal and external approval levels.

DOD now has a stated preference for commercial products and technology. Removal of unique government contract terms and conditions creating artificial barriers between DOD procuring activities and the commercial suppliers is essential to facilitate this preference. To this end, DOD now invites and encourages contractors to propose non-government technical specifications, management standards, and other industry wide practices to satisfy product needs and demonstrate management discipline. DOD used military-unique product specifications and management systems when there were few commercial practices with the specificity or control required. Today, commercial specifications and standards are more widespread, consistent, and stringent in many areas than their military equivalents. In the private sector, using commercial specifications and standards is voluntary.

One of the most pervasive unique military-imposed management requirements still confronting DOD today is the issue of government configuration management and control. Why must the government take direct responsibility for configuration management and control at all? This question quickly raises several concerns, most of them interlocked with competitive procurements, replenishment and logistics supportability. Some of these concerns include--

- Who identifies and controls critical interface, interchangeability, and functional interoperability issues?
- What audit and status accounting processes ensure the user of fielded system configuration?

- How will maintenance and repair be accomplished? Will contractor logistics support (CLS) be used?

How product support occurs, including spares, training, and manuals? Embedded in this concern is the risk of obsolescence to previously procured materials and logistics documentation caused by “uncontrolled” design changes.

A more detailed discussion of this last item is under the logistics management topic further on in this chapter. The other two CM issues are part of a performance based contracting approach to meet Government requirements.

### **7.1.1 CONFIGURATION CONTROL**

The Government is always the configuration manager for DoD materiel. the issue is what is the Government managing and what degree of configuration control will the Government exercise. In the past the government maintained control in nearly all cases through one of three primary means:

- In-house government control of the TDP with minimal contractor involvement. This is most frequently the case for products out of production and the primary requirement is spare parts to support fielded systems.
- In-house government control of the TDP with a significant amount of contractor involvement. This is often the case for products still in production by the original developer or a new source.
- Contractor maintenance of the TDP with some level of guidance and control by the government. This control may be minimal for items virtually "off-the-shelf" or quite extensive for items that evolve through a development program.

The third case is most frequent for commercial and non-developmental procurements. Most other procurements fit one of the first two cases. A variation to each of these cases has the government contracting with a third, independent party to provide functional CM support. In all cases, the Government is the configuration manager and exercises configuration control of the TDP whether it contains a detailed design, performance specification, commercial item description, etc.

Use of performance specifications promote control and maintenance of the TDP toward the third case. Industry retains control of, and responsibility for, the detailed configuration throughout development and production. The government retains control and final authority only over top level performance or functional specifications to ensure products continue to meet originally defined user needs. These top level requirements are ones affecting form, fit, function, interface, and interchangeability. A major consideration during preparation of the acquisition plan is establishment of the limits of the contractor's change authority. Defining these configuration control limits has a

profound effect not only on subsequent product supportability but also future government plans for competitive procurement.

Very precisely identified interface and interchangeability requirements in the performance specification becomes essential to carry out both of these government activities. When the government indicates at what product level(s) hardware interchangeability is essential to meet the user's maintenance and supportability concept, suppliers must then demonstrate this level of interchangeability to be in compliance with the performance specification.

The resulting implication is the contractor now has total authority to make any design, material, or manufacturing process change below this stated level of specified interchangeability as long as any of these changes do not impact any other performance requirement. The common term for everything below that level is the "black box." A new term for this in open systems architecture is the "atomic level." Everything from this level and below become throwaway items in the supportability concept except for elements which will be repaired. When an element is to be repaired or overhauled to restore it to "like new" condition, the detailed design requirements are required for this action. The Government must make these configuration management, supportability and maintainability decision very early in the life cycle and the determine what data rights it wishes to procure.

Note the configuration authority for changes below the control level has not changed, but the Government control level using performance specifications is much higher and gives industry what today is Class 1 ECP authority and responsibility on most, if not all, detailed design changes. Using performance specifications normally restricts government Class I control authority to performance characteristics of form, fit, function, and those levels of interface and interchangeability clearly delineated in the performance specification. In return for this freedom, the government expects beneficial improvements in product performance coming from continuous insertion of new technology.

Another expected outcome is more affordable prices resulting from increased industrial productivity as the government also relinquishes control over the management details of manufacturing operations usually imposed through various MIL-STDs. Clearly delineating the government's dominant responsibility for controlling and managing the functional elements of configuration and designating the contractor responsible for managing the majority of the physical configuration should ease haggling over the often contentious issue of due compensation for engineering changes. The "How much money are you going to give me back if I 'ease up' on a specification "requirement" which I 'paid' you to produce?" kind of argument goes away because it is not really about "requirements" after all.

An issue that causes much consternation to many government managers is the contractor becoming a "single source" for the product TDP in acquisitions using

performance specifications. The question of how the government competitively procures spares or repair parts for organic support products always arises. This probably involves most items at unit level activities regardless of the basic support concept. Remember, a TDP is always available, although not 'free'. The government purchases data rights, but more to the point limited data rights, now. This will not change using performance specifications except be less frequent and only when proven essential and cost effective.

The government could even contractually arrange for a contractor to take a current government-owned TDP, have it updated to reflect the latest physical configuration, and secure the right to procure all or portions of this TDP in the competitive marketplace using the same performance requirements that the contractor employs. In other words, the government can buy parts to the same performance requirements as a contractor. The government will use only those portions of the detailed TDP needed to indicate the critical interface and interchangeability requirements and then verify the parts do actually meet those requirements. The government loses nothing over the way it does business today other than the major overhead costs of buying and maintaining detailed design data for every product it develops or buys. It certainly stands to gain much more.

Delegation of CM responsibility encourages contractors to make product improvement changes. The government must still ensure such changes do not negate support for legacy systems or uneconomically render spares and repair parts already in the support system obsolete. The government uses interface, interchangeability, and interoperability criteria as key management control elements to address this issue.

The government must clearly spell out its level of control and interest in these issues as part of the solicitation and contractual terms and conditions. For example, contracts awarded to dual sources specifically should require interchangeability and interoperability of units from both current producers as well as any prior producers. The key is setting interchangeability at a level where product support is economical, either organically or by CLS. Data from up front market research and analysis and government-conducted LSA help determine where that level lies.

One last question involving CM decisions is what to do when rapid technology advances offer significant increases to combat performance or cost reduction potential but these opportunities breach contractual requirements or invalidate material already in supply channels. In such situations, the proposed change(s) exceed contractor CM authority. Decisions on issues like these require prior government approval to implement. This is no different from today.

Implementing such changes requires a conscious government decision to accept the improvement tradeoffs over the potential impact to supportability for fielded systems and materials on hand. Using performance specifications coupled to an open systems

technical management approach to swap out the new technology at convenient interfaces is one way to hedge against the economic impact of these situations.

### **7.1.2 CONFIGURATION AUDITS**

Requirements for both an FCA and a PCA are common management requirements for many procurements. In a performance-based acquisition approach, the government's primary requirement is the performance of the system. Does the product really meet the performance requirements of the specification? The "physical configuration" of the product is the responsibility of the contractor who is free to change any design aspect as long as the changes do not violate any performance requirement of the specification. As a result, a contractual requirement for a PCA is no longer important. A 'quality' contractor is sure to conduct an internal PCA anyway. The results of a government sponsored FCA, on the other hand, take on major importance. FCA results mark a key measure of contractor compliance with the performance specification requirements.

The government may wish to satisfy itself the cumulative effect of numerous subsequent design or material changes did not degrade product capability to meet specified performance levels. Imposing some type of "follow up" FCA may be beneficial on a production contract. This audit is unnecessary unless there is concern expressed by the user or other quality data to indicate presence of a problem. A subsequent FCA is always in order when there are modifications to the performance specification.

### **7.1.3 CONFIGURATION STATUS ACCOUNTING**

A management system capable of effectively tracking configuration items (CI) is necessary for managing any complex technical product or system. This system would normally include CI documentation, the status of proposed and approved changes to that documentation, the status of waivers and deviations; and the configuration of all end items produced under the CI. Any contractor worth putting on contract will have such a system. This brings up an important difference between the government being responsible for the TDP and having the contractor responsible for design details.

With performance specifications, the government does not routinely have, or routinely need, visibility below the CI level. It relinquishes approval authority in the areas cited unless there are changes to the performance specification involved. Regardless of any management system in place, the delivered product must meet the performance requirements, including demonstration of required interchangeability to the level required by the CI. The sensitivity to determine if a contractor has adequate and effective configuration, or any other, management system in place to successfully perform contracted work now becomes an important source selection consideration, not a postaward concern. The ability of the Government to accept data from the contractors systems is also a major issue. Normally, although not mandating a system,

data compliance with MIL STD 2549, Configuration Management Data Interface Standard, should be required when there is a requirement for the Government to take possession of the contractors data.

Here again is another example showing how a performance-based contracting approach can work to all parties' advantage and result in best value. The contractor takes on a greater responsibility for first-time quality performance but gets greater freedom to deliver without "excessive" or unnecessary government interference. The government gets better, more affordable products by giving up strict management control. Both parties equally share some risk, but both share significant opportunity for success. The risk protection to both parties rests on clear definition for interchangeability in the performance specification and commitment to delivery of that performance backed up by the warranty provisions in the contract.

## **7.2 LOGISTICS MANAGEMENT**

One of the most important issues associated with CM is the supportability for fielded products. This support includes maintenance and repair, spares and spare parts support, personnel and training implications, and system modifications and changes over the life cycle of the product. Support concepts for fielded products range from a totally organic capability to full contractor logistic support and most variations in between. Under a performance-based acquisition approach, most of these strategies remain viable although some may prove less suitable. The need for timely logistics support decisions still exists. Performance-based acquisition drives the need to make these strategy decisions in the preaward phase of an acquisition instead of waiting until after post product design support analysis.

### **7.2.1 SPARES AND REPAIR PARTS**

Resolution of the CM issues cited earlier bound, if not determine, most of the spare and repair parts issues. For example:

- What level will the government maintain control of the product?
- What level will, or can, the government spare and maintain the product? If below the CI level, how will the government buy these parts?
- Can the government procure dash-number parts as they become available and know their use will not degrade product performance?
- Is there a warranty provision specifically covering all the performance requirements of the specification?

## **7.2.2 REPAIRABLE ITEMS**

Repair by replacement lends itself very easily to the use of performance specifications. However, when physical repair or overhaul is contemplated, the detailed design data may be required. This determination needs to be made early in the life cycle in order to make determinations about configuration control, data deliverables, and data rights.

## **7.3 MINIMIZING THE IMPACT OF CHANGES**

A great concern to the logistics community is always that frequent product changes invariably bring disruptive changes to support. The traditionally perceived risk to DOD is such changes quickly make many dollars worth of previously procured spares and repair parts obsolete. At first glance when using a performance specification, the probability of such change might seem high, since the concept places CM responsibility for the physical, detailed design with the contractor. In products which employ rapidly evolving technologies, there is more than a probability, it is likely. A performance specification, including clearly stated requirements for interoperability and interchangeability at known critical functional and physical interfaces, greatly minimizes the impact of this risk.

Another area where the need for change typically emanates is feedback from operational testing or field experience. If changes are indeed due to the inability of products to meet stated performance requirements, the responsibility for correction still rests with the contractor. This is no different from today. Sometimes, the product meets the specification but those specification requirements were not truly reflective of the user's original operational, performance, and functional needs. To prevent much of the "negative" feedback from this situation, the definition of requirements in the specification must clearly reflect all user needs. Making sure this occurs makes user involvement in defining the performance requirement all the more acute.

Sometimes, the user's needs legitimately change. There may be other times when changes to the performance specification are desirable or advisable. The need for such changes will increase in frequency in an era of declining budgets as DOD attempts to extend the service life of major items of equipment. Obviously, the government must accommodate such changes through ECP but must carefully consider the total impact to the entire support environment. Obviously, any change to the performance specification involves a government CM decision, regardless of how the proposed change surfaces. The government still retains control over the functional configuration.





## CHAPTER 8

### VERIFICATION ISSUES

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#### 8.1 QUALITY ASSURANCE

Quality is generally defined as "fitness for use." This fitness is the totality of an item's characteristics which make it suitable to satisfy user's needs. The item design, the manufacturing processes that make it, and operational employment all have an influence in determining that "totality." In the context of performance-based acquisition, "quality" is a collective term similar in concept to "value for money."

An equally useful, and possibly more practical, definition for quality is "minimum variation (predictable uniformity) around target values (requirements)," both physical and functional. A simple example illustrates the functional uniformity concept. The desired Mean Time Between Failure (MTBF) for an electronic device is 1000 Hours with a confidence factor of 95 percent. A device with reliability measured at  $1000 \pm 50$  Hours MTBF is more desirable than a unit measuring at  $1000 \pm 250$  Hours MTBF with the same confidence factor. Both units have the same MTBF but the first has a more uniform predictability around the functional "requirement."

The main reason why one product is more reliable than another product, even built to the same design, is the physical uniformity of the components that comprise the product. In other words, there is a direct relationship with expected reliability and products made from piece parts or components manufactured very close to nominal design value using very little of the allotted design tolerance. A turbine engine with all its "high-tolerance" blades and vanes illustrates this physical uniformity concept. The engine becomes less reliable with increased physical variation in the critical characteristics of those parts, even if every one of them measures within design tolerance. The concept is an important one to keep in mind in any discussion about specifying and assuring quality.

Assuring desired quality begins with a performance specification that articulates a clear and unambiguous definition of the user's technical needs. Within the government's principal role of managing only the functional configuration, the statements in Section 3 of the specification define the quality characteristics upon which verification of "fitness for purpose" (satisfaction of user needs) is made. Thus, the performance requirements stated in Section 3 of a specification are synonymous with "Quality." Industry takes this information, designs and manufactures product(s), or provides ones already on-the shelf, that encompass all the characteristics of the defined need(s), and delivers a solution to satisfy the user. Stating the user's needs clearly in the performance specification is one of the best things the government can do to ensure the delivery quality products.

In the commercial marketplace, buyers select products to satisfy some need (requirement) based on a variety of information sources, some supplier-provided and some from independent sources. Value (product functions, features and cost) and past performance (company reputation) form the basis of selecting the best source. The customer accepts the product with a certification of conformance backed up by supplier warranty provisions to remedy deficiencies (or lack of “quality”).

The dynamic forces of the marketplace (reputation, past performance, competition) provide assurance to the astute customer that the quality of a product purchased is trustworthy. This trustworthiness comes at no extraordinary cost to the customer. Additional assurances, such as extended warranties, are available, at additional costs, of course. The question then becomes one of value for these added costs for further reduction of the risk of NOT receiving a satisfactory product or service. Every buyer repeatedly faces these questions about quality and value for every product purchased.

The special supplier-customer relationship and expenditure of public funds creates some difference in defense procurement, including some terms and conditions in defense acquisition not generally found in commercial buying. These special contractual arrangements should not, however, cause the government to pursue quality any differently than anyone buying a product for personal use. If the dynamic factors that determine delivered quality are the same, the “assurance” process should be at least similar. Past defense acquisition quality management practice was quite different, though. It routinely required extensive test, examination, and evaluation of each and every requirement, from critical performance requirements to incidental dimensions, at ambient temperatures to environmental extremes.

All this “assurance” added tremendous cost to the product. Even though no one ever disagrees with the statement “You cannot inspect quality in,” the typical “quality requirements” in specifications is evidence enough this is exactly what is happening. If the acquisition process selects the “best” product, the “best” supplier, and gets the “best” warranty, how much more assurance is necessary to reduce the risk of NOT meeting the requirements? The question becomes one of what value is the added cost for the added examinations, tests, and evaluation?

Experience shows that cost is seldom a conscious consideration in establishing the verification provisions in specifications and DDD. Worse, there is no simple means to reduce these provisions and their cost once they become part of the requirements. Even when suppliers demonstrate process capability and control, the examinations, tests and evaluations continue, based on the sampling plans, Acceptable Quality Levels (AQL), Lot Tolerance Percent Defective (LTPD), or 100 percent inspection requirements called out in the specification and DDD. This represents added costs with little or no value added, or risk reduction either in most cases.

“Bad” product, scrap, rework, repair, waivers, deviations, reengineering, and delivery delay still occurs today largely for two reasons. First, an inspection-based quality

management philosophy focused on industry's design and manufacturing activities, detailed design TDPs, and post-manufacture product inspection and test, remains very much alive. Secondly, the specification process of the past embedded this philosophy into most of the specifications and DDDs still used in DOD procurements today, regardless of policy.

The following situation describes how pervasive the problem is and how difficult it is to change the "culture." In October 1986, and reaffirmed three times since, DOD issued policy and directive to clearly prohibit continued references to AQL and LTPD in DOD specifications. By unintentional practice, the usual wording in specifications referencing AQL or LTPD was inadvertently prescribing government acceptance of fixed levels of defects or nonconformance in delivered products. DOD even directed the Single Stock Point for Standardization Documents in Philadelphia to refuse publishing any new or revised military specifications with references to AQL or LTPD after June 30, 1989. Most specifications on contract today still contain these requirements or other sampling plan wording that, in effect, perpetuate the problem.

Past argument suggested nominal industrial quality management was inadequate to assure the government the quality it desired without implementing more rigid quality system management measures. This led the government to impose stringent quality management requirements, both in specifications and contract SOW. As outlined earlier, this strategy does not necessarily assure quality in delivered products but does, most assuredly, increase product costs. There is a much more efficient and cost-effective way to address the quality question. The government must recognize "quality" to be synonymous with a clear statement of the user's needs in performance terms in the Section 3, and the criteria for confirming delivered products meet these requirements in Section 4 of the specification.

Under performance-based acquisition, quality management systems, organizational structure, standards, practices, sampling plans, inspection, and tests methods are industrial manufacturing processes under the prerogative of the contractor. Current policy prohibits government procuring agencies from imposing specific quality management system requirements like MIL-Q-9858A or ISO-9000 in contracts. Instead, the government wants to focus on what determines quality, not just sort the good from the bad after the fact. Desired quality is a derived outcome--a result--of a good systems engineering analysis and synthesis process. Such processes employ tools like Quality Functional Deployment (QFD), Design of Experiments (DOE), and Statistical Process Control that continually focus on the user needs throughout the product development and manufacturing cycles.

The government needs to focus and manage the factors that cause quality to happen. Acquisition managers must spend more time and resources up front to evaluate and decide which contractor or product, and, therefore, which "quality," represents the best value that meets the need. Contract source selections must focus on a contractor's past performance and proven ability to design, manufacture, and

verify delivered product quality to specified performance needs. Contractors chosen with this philosophy stand a far better chance to deliver quality than “wannabes” that can only talk about it.

## 8.2 TEST AND EVALUATION

The government has a vested interest assuring that delivered products meet the performance requirements of the specification. The management approach to accomplish this verification can take a number of forms. Striking a balance between cost and assurance is important. One testing principle to always remember is this. Testing for “new” knowledge (except in laboratory or development situations) is akin to “inspecting in quality” and the most expensive way to go about it.

For example, a Certificate of Conformance might be the most expedient way to accept straight off-the-shelf commercial products. Periodically evaluating selected processes through oversight may be appropriate for more complex but still relatively low risk situations. On the other hand, a vigorous all-inclusive test and evaluation approach might be necessary at first for high risk, new product or technology developments or for procurements from previously untried sources. This approach is obviously the most expensive because of the resources and time it takes and the data it generates.

Selection of a verification strategy and the amount of test and evaluation needed depends upon various risk factors of the acquisition. Depending upon the risks involved, the government might accept greater use of cost-effective alternative verification techniques by the contractor such as simulation, modeling, sampling, property analysis, or similarity comparison. Whatever the factors, the strategy decided upon should cover all essential aspects of the technical requirements and be capable of demonstrating product suitability for its intended purpose in every product delivered.

The contractor is responsible for verifying all delivered products meet all specification requirements, without exception. The government routinely accepted products in the past with “Minor” non-conformances, primarily because these non-conformances did not affect form, fit, or function in the past. There is no such thing as a minor nonconformance to a performance specification. In performance-based acquisition, all the requirements stated in Section 3 of the specification constitute the total “definition” of the need and are, therefore, essential. If verification of any one of the requirements is lacking, the product is not a quality product and does not satisfy the need by definition. Accept on zero-reject on one is the overall product acceptance criteria for verifying performance specification compliance.

Skillful application of test and evaluation engineering knowledge to select the right verification criteria is critical to make a performance specification effective. The government should select its criteria for confirming performance of the functional configuration based on nongovernment standards and other accepted industrywide

verification practices and place this criteria in Section 4. This criteria should not contain process control methods and techniques for detailed manufacturing processes used in product manufacture, such as magnetic particle inspection, welding, soldering, etc. The contractor has total responsibility for performance and control over these industrial operations and manufacturing processes.

Effective performance-based criteria indicates clear pass or fail limits. Any product failing to meet any of one of the stated criteria fails to meet all of them. The government may independently verify or challenge the contractor's results, at additional government expense, by conducting operational testing or arranging for third-party testing or inspection. Place the information about any arrangements for performing or monitoring this additional verification in the solicitation and contract documents, not in the specification. Consider using independent verification very cautiously as it is very expensive and only adds to more cost to the procurement.

### **8.3 WARRANTY AND CERTIFICATE OF CONFORMANCE**

Performance specifications give contractors greater responsibilities, greater incentives, and much more overall product control. One of the government's primary contractual safeguards to ensure delivery of compliant products must be a strong warranty. The contractor warrants the performance of the product against the specific performance requirements identified in Section 3 of the performance specification. DOD experienced some difficulty structuring meaningful warranties in the past. No matter how convenient it would be, a warranty cannot prevent a bad design or cure a poor quality contractor.

In performance-based acquisition, however, DOD must insist the contractor warrant the hardware consistent with the functional configuration derived from the performance specification. The warranty ensures the government gets the product it expected as a result of the source selection which elected that particular contractor and product. Remember, the contractor can make all the detailed design, material, and manufacturing process changes desired within the allocated, product, material, or process specifications if, and only if, these changes do not affect that functional configuration, including supportability. A performance guarantee is one of the simplest warranty approaches to use. It ties satisfaction of the performance specification requirements to the contractor controlled product configuration.

Such a warranty represents a major departure from many, if not most, warranties on contract today. Developing and exercising an effective warranty is difficult to accomplish when issues over the government controlled detailed designs drive the acquisition process and warranty provisions. The sheer amount of paper or effort required to enforce it is frequently a deterrence. Obviously, if warranties are difficult to enforce or require additional out-of-the ordinary effort by the user, their usage will be minimal and the government loses an effective performance management tool. A

move to make defense acquisition more commercial-like with the use of performance specifications brings with it the need for an improvement in warranty management.

One successful approach has all failed parts removed during the warranty period returned to the Defense Contract Management Command (DCMC) function at the contractor's facility for repair. If DCMC determines the failure is a warranty issue, the contractor repairs or replaces the item under the warranty clause of the contract. If DCMC determines the failure is nonwarranted (such as an operator driving over the item--an extreme example), the contractor repairs the item under a support services provision in the contract. In either case, the repair or replacement process is transparent to the user in the field and does not require special or peculiar paperwork to cause the hardware repair or replacement.

Such a program appears to lock the government with a developing contractor in a sole source relationship in the "front end" of a production program. It does but this is the very period the developing contractor's responsibility for the adequacy of both the design and the product built to that design, including any associated liabilities, is all important. Rarely, if ever, is the developing contractor not the contractor also selected for early production.

Effective warranty provisions should concentrate on those areas of the product that failed in developmental test or where components or piece parts experienced difficulty in manufacture. Remember the connection between reliable product function and physical variation in manufactured piece parts. This approach allows the government to leverage its scarce warranty dollars. For more mature acquisitions, however, the situation changes. The government, with operational test and field experience, satisfies itself the product meets its specified requirements. Then the primary warranty interest becomes one of consistency against a "proven" specification, a situation not dissimilar to a pure commercial warranty.

Storing delivered product in a depot for an extended time before field issue presents another warranty management problem to the government. Often, the government finds the product defective long after the warranty expires. While this situation is all too prevalent, the cure is simply a provision that starts the warranty at item issue, not at government acceptance. The warranty on an automobile starts when the buyer drives off the lot (starts using the product), not at factory shipment. Warranty management often calls for a lot of creativity and certainly for some advanced planning. For example, the government might choose to pay the contractor for intermediate storage, and start the warranty period only after removal from storage. This requires the incorporation of storage and environmental conditions, if they are critical and do affect the perceived quality of the product, to be in the performance specification.

Another way government accepts products and protects its interest is using a Certificate of Conformance (COC) in lieu of traditional test, inspection, and acceptance

procedures. This is entirely possible if contractors consistently demonstrate a high level of integrity, performance, and quality in products delivered to the government.

Even though this procedure is available to the government, procuring agencies rarely use it, even with high-quality producers. Increased use of COC places greater responsibility on the contractor but the result can be cost reductions for both the contractor and the government with no expected degradation in the delivered product quality. In addition, the COC provides the government legal recourse and remedy should the delivered products subsequently prove defective or noncompliant with the contract requirements. An increase in use of COC for acceptance of products from high-quality producers would definitely benefit DOD.

#### **8.4 QML/QPL**

Creating a Qualified Manufacturers List (QML) or a Qualified Products List (QPL) is a process in advance of and independent of an acquisition by which the government examines, tests, and approves a manufacturer's capabilities, or a manufacturer's or distributor's products, to be in conformance with specification requirements. Subsequent contract awards for these qualified products or from these contractors for the types of product lines they qualified come directly from these lists. The government identifies and determines beforehand suppliers with available quality products or their capability to produce quality products known to satisfy user needs. QML and QPL represents another tool to vastly streamline the acquisition process, save limited acquisition resources, and assure satisfaction of quality.





## CHAPTER 9

### PERFORMANCE SPECIFICATION BENEFITS

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#### 9.1 THE INDUSTRIAL BASE ISSUES

Repeated government and industry studies suggest increasing the integration of military and commercial technology and production lowers overall defense costs, promotes technology transfer, increases available industrial capacity, and strengthens the economic dimensions of national security. The cost of maintaining the classic dedicated defense industrial base is too high in today's competitive economic environment. The revolution in many modern technologies, especially electronics, is driving the concept of a competitive national industrial base capable of satisfying both commercial and defense needs. The deep reductions in defense spending make this integration all the more acute.

Detailed military specifications and standards constitute a major barrier to the required integration of the commercial and military industrial sectors. This barrier increases defense acquisition costs, places extra burden on defense contractors seeking to diversify into commercial markets, deters leading edge commercial firms from participating in defense work, and obstructs the flow of technology between the two sectors. Lowering the barrier between these sectors fosters peacetime production efficiency by reversing all these negative trends.

DOD still needs a dedicated defense industrial base for some systems. Sources for technologies truly unique to military application must remain viable and available. The new scope of the defense industrial base would center on technologies predominately related to satisfying requirements in defense-dominated arenas such as space and missile, stealth, armor, munitions, and nuclear propulsion applications. Compared to the past, the size of this base is vastly smaller. A simple fact makes this true. Except for the few areas mentioned, there is no direct correlation between a military mission and where the product comes from to satisfy that mission. Commercial and dual use products and products manufactured on single production lines have proven quite satisfactory "under fire."

The commercial industrial base is where it's all happening in today's competitive global marketplace. An often cited but all too true example of this fact is most of the marvelous capability of today's integrated electronic circuits is being driven by commercial enterprises and customers. It takes a lot of computing power to drive the screen simulations being pumped out at Steven Spielberg's Dream Works movie factory. He can afford what it costs because the economics of the marketplace favor him. DOD, on the other hand, represents less than 1 percent of the total U.S. IC market.

A more mundane example of this shift in DOD market position is in heavy equipment tires like the ones used on light assault vehicles or heavy expanded mobility tactical trucks. DOD as a customer represents less than 2 percent of the annual sales of the leading supplier of the tires for such vehicles. The superior traction, durability, and safety performance characteristics and marketplace availability of this company's regular commercial line tires make them a desirable, best value buy for both military and commercial use. Tires purchased using government specifications and other unique contract terms and conditions could conceivably drive up purchase price estimates by as much as 50 to 300 percent, depending on order quantity and rate. It does not pay to be a small customer in a big market demanding unique products, capabilities, or services.

Such business practices needlessly waste scarce defense dollars and do not put combat capability in the hands of the fighting forces. In the past, DOD was not as sensitive to this issue as it might have been because threats were urgent and budgets were large. Industry was complicit because DOD represented a large volume of sales and reimbursed companies for costs incurred in compliance with the contractual desires of this "unique" customer. These conditions no longer define the defense marketplace. As DOD adjusts to the prevailing economic and industrial conditions of the post cold war era, it must continue to field technologically superior, affordable defense for the nation. The systems deployed will come, however, from a strengthened national industrial base comprised of both the commercial and defense bases.

## **9.2 ELIMINATION OF OBSOLETE SPECIFICATIONS AND HAZARDOUS MATERIALS**

The National Defense Authorization Act for Fiscal Year 1993 directed that DOD contracts may not include any specification or standard requiring use of a Class I ozone depleting material without justification and approval by a senior acquisition official. This statute focuses on eliminating hazardous materials and processes from DOD acquisitions. It is another extremely valid reason for DOD to transition from detailed to performance specifications.

Many old, detailed military product specifications and management standards restricted product acceptability to ones defined in those documents and DDD that referenced them. Industry had no choice but to comply with their customer's demands. When the specifications and standards included undesirable materials and processes, the acquisitions that included them perpetuated their use and, likewise, deterred pursuit of alternative solutions that would not. Since effective performance specifications do not specify design, material, or process solutions, use of performance specifications go far in remedying this situation. Industry is at liberty to find and use environmentally friendly materials and processes.

## CHAPTER 10

### PERFORMANCE-BASED CONCEPTS FOR SERVICE CONTRACTING

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#### 10.1 OVERVIEW

Performance-Based Service Contracting (PBSC) means structuring all aspects of an acquisition around the purpose of the work to be performed. It means describing the contract tasks in terms of outcomes or results instead of telling a contractor how to do a task.

More detailed discussions of PBSC are available in the following documents: Federal Acquisition Regulation Subpart 37.6; and the Office of Federal Procurement Policy's Policy Letter 91-2, "Service Contracting" and "A Guide to Best Practices for Performance-Based Service Contracting." The latter two publications are available from the Acquisition Reform Network via the Internet at:

<http://www.arnet.gov/Best/PPBSC/BestPPBSC.html>

The purpose of using a performance-based approach to service contracting is to mitigate cost overruns, delays, and performance problems.

The essential elements of PBSC are:

- Performance Requirements (what needs to be done).
- Performance Standards (how well it needs to be done).
- Measurement Techniques (how performance will be assessed versus standards).
- Incentives – Positive and Negative (tied to performance measurements) .

#### 10.2 PERFORMANCE REQUIREMENTS AND PERFORMANCE WORK STATEMENTS

Performance requirements define the contracted work in measurable, mission-oriented terms. Tied to these requirements are the performance standards (i.e., timeliness, quality, and quantity). The requirements and standards together directly relate to the contract deliverables.

An interdisciplinary team approach and market research are essential to describing outcome oriented services that reflect stakeholder needs and market capabilities.

The first step in developing a Performance Work Statement (PWS) is to identify the organization's needs and to address those needs in quantifiable/measurable performance terms. Developing clear and concise work objectives and conducting a thorough job analysis helps to develop meaningful performance requirements.

Job analysis is a practical method for investigating and describing the work to be done in such a way that you are left with an organized structure that allows an easy development of the PWS and performance standards. This analysis consists of a step-by-step review of the task requirements and results in a clear definition of the expected outputs and measures of performance.

The PWS is key to the solicitation and management of the contract. Just as with performance specifications, the performance work statement or PWS must focus on the desired outcome of the required tasks. The PWS must include measurable standards. This means the work statement should describe a task in clear, specific objective terms with a measurable outcome.

The work description must be direct enough so there is no question of the desired result but open enough so alternative methods to accomplish the work are possible. For instance, instead of stating, "The contractor shall strip, wash, and rewax the floors every week" (how to do the job), the requirement should state, "The contractor shall ensure the floors are clean and free of scuff marks." Creating clear verification standards, in this case for "clean floors," may take some added definition, but is essential to measuring performance.

### **10.3 PERFORMANCE STANDARDS**

Performance standards establish the performance level required by the Government. Standards must be necessary, clearly described, and not unduly burdensome so as not to increase contract costs.

Discretion is necessary in establishing the quality level at which performance standards are set. If the quality level is too high, the cost of the service may be prohibitive. If the quality level is too low, it may act as a disincentive to good contract performance.

Standards may be drafted based on past workloads, best practices, published, or well-recognized industrywide standards. Industry input should be solicited to ensure that the standards are realistic and effective.

### **10.4 MEASUREMENT TECHNIQUES**

To ensure performance is being met, the government develops a plan to measure the contractor's performance based on the performance requirements. An effective surveillance plan contains the standards and surveillance methods the government uses during the contract to assure the contractor is meeting or exceeding the performance standards.

In addition to the standards, the surveillance plan contains the planned, systematic method for monitoring contract performance. Using a surveillance plan provides the government with disciplined way to determine if the contractor is meeting the standards or the basis for subsequent management action.

Writing the surveillance plan concurrently with the work statement is good practice. A well-written performance work statement helps isolate the performance standards. A surveillance plan should include a sampling guide on the frequency of government monitoring activities, an activity review checklist, and the surveillance methods. Remember, the goal of the surveillance is to review the contractor's performance, NOT the details of how the work is being performed.

There are a number of ways to assure contractor performance. Use the most efficient surveillance method for the particular type of service performed. Consider the following surveillance methods when developing your surveillance plan.

- Review the contractor inspection program. The government should ensure the contractor has an effective quality control program and is adhering to that program.
- Monitor existing contractor Management Information System (MIS) data. There may be cases where there is an existing management information system from which to gain information on contractor performance. Since a MIS may contain large amounts of performance readily available data, this may be a very efficient and preferable source of performance data.
- Sample contractor performance. Sampling of contractor performance provides a useful and fair way of determining if the performance is acceptable, especially on recurring tasks. Sampling may be random (statistically based), planned (on some basis other than strict randomness), or unscheduled. The QASP should include the criteria for the method selected or for switching from one method to another. Method selection depends upon frequency and criticality of the service and other factors such as availability of inspectors and geographic dispersion of the work.
- Track customer complaints. A customer complaint program needs emphasis and publicizing. It may produce information not tied to evaluation criteria. This approach is helpful in situations with limited inspector resources or subjective aspects of the task determine quality. If customer complaints support a fee reduction or penalty, a validation system must be in place.
- Establish a comprehensive feedback process. A comprehensive feedback process, including periodic questionnaires, comment sections on work orders signed off by the customer, and structured interviews are often useful in conjunction with an award fee program.

## **10.5 INCENTIVES**

Service contracts should include incentive provisions to reward quality performance and discourage unsatisfactory performance. Positive incentives are actions taken if the contractor's performance exceeds the standards. Negative incentives are actions taken if the contractor fails to perform the work to the specified standards. Positive incentives should be set at challenging yet reasonably attainable standards. Positive incentives encourage contractors to find innovative ways to reduce management, operating, or support costs by allowing contractors to share in the cost savings related to the productivity improvement.

Incentives should correlate with results. Where negative incentives are used, the deduction should represent as closely as possible the value of the service lost. Where positive incentives are used, the contractor should not be rewarded for simply meeting minimum standards of contract performance. Follow-up is necessary to ensure that desired results are achieved, i.e., that incentives actually encourage good performance and discourage unsatisfactory performance.

## **10.6 BENEFITS OF DESCRIBING SERVICES IN PERFORMANCE TERMS**

Implementing performance-based service concepts has numerous benefits:

- Clear and definite performance requirements decrease the level of contractor uncertainty and potentially open the competitive field. Performance terms better enable potential offerors to determine whether their capabilities match the requirements.
- By not telling an offeror how to do the job, the offeror can propose alternative work methods. Rather than forcing the offeror to propose on and follow rigid and potentially out-dated work methods, performance-based work statements allow offerors to bring innovations to the service provided.
- For program personnel, PBSC is a tool that offers an opportunity for improved contractor performance.
- For resource personnel, PBSC has already demonstrated significant cost savings.
- For managers, PBSC implements the principles of streamlining and innovation of the National Performance Review, as well as the Government Performance and Results Act.

## **10.7 PERFORMANCE-BASED SERVICE CONTRACTING (PBSC) SOLICITATION/CONTRACT/TASK ORDER REVIEW CHECKLIST**

The following checklist contains minimum required elements that should be present for an acquisition to be considered as performance-based. It is but one tool that may be used to assist in developing and assessing performance-based requirements for services.

### **Minimum PBSC Requirements.**

- Performance requirements that define the work in measurable, mission-related terms.
- Performance standards (i.e., quality quantity, timeliness) tied to the performance requirements.
- A quality assurance or performance measurement plan that describes how the contractor's performance will be measured against the performance standards.
- If the acquisition is either critical to agency mission accomplishment or requires relatively large expenditures of funds, positive and negative incentives tied to the surveillance plan measurements.

### **Additional PBSC Components.**

- An historic workload or job analysis is performed, or the workload is estimated if historic data is unavailable, to aid in determining the performance requirements and standards, surveillance plan, and incentives.
- The solicitation and contract/task order convey a logical, easily understood flow among performance requirements, performance standards, surveillance plan, and performance incentives.
- Process-oriented requirements (e.g., job descriptions, education requirements, level-of-effort) and reports are eliminated to the maximum feasible extent.
- Government evaluators of contractor performance are trained in PBSC.
- Commercial and/or industrywide performance standards are relied upon, where available.
- Industry and government stakeholders are provided the opportunity to comment on draft performance requirements and standards, the Government performance measurement plan, and performance incentives.

- The contract/task order is completion type (vs. term type or level-of-effort).
- Multiyear contracting authority is used where available.
- Experience and lessons learned from predecessor acquisitions are used to convert recurring requirements to PBSC.

**Other Considerations.**

- A tradeoff source selection process is used with emphasis on past performance to select the proposal representing the best value.
- Informal conflict resolution techniques are utilized (e.g., alternative dispute resolution, ombudsman, formal partnering agreements).
- An umbrella-type contract that has demonstrated significant performance problems, cost overruns, or has included an amount of work that is too great or diverse to be effectively managed by either the Government or the contractor, is broken up into multiple contracts, where it makes sense to do so.



## CHAPTER 11

### ACQUISITION STREAMLINING AND REFORM - THE BOTTOM LINE

In the late 1980s and early 1990s, DOD found itself unable to acquire many state-of-the-art technologies being developed by and for commercial enterprises as the government's leverage as "big customer" diminished. It often could not buy even routine products from commercial sources because these companies refused to accept unique management requirements as part of the terms and conditions of government contracts. These unique requirements caused the cost of doing business with DOD to be too expensive, for supplier and customer. Reliance on a shrinking dedicated defense industrial base also uncompetitive and prohibitive.

The solution was evident. DOD committed to an acquisition streamlining and reform revolution, an across the board total reengineering of the acquisition system. The DOD shifted from a reliance on a defense industrial base to an integrated national industrial base incorporating both commercial and defense sectors capable of supporting current and, more importantly, future needs. DOD also committed itself to reducing acquisition costs by adopting business practices characteristic of world-class customers in the commercial marketplace. These actions received the support and active participation from all the stakeholders involved--DOD, the Services, Congress, and Industry.

The basic shift towards using commercial practices and melding the military and commercial sectors into a single national industrial base is evident in the way DOD began to conduct its business since 1994. This change is both encouraging and beneficial. Changing to commercial practices benefits all participants in the acquisition process: users, the DOD and suppliers. Users benefit from having new technologies and capabilities available through increased competition. DOD benefits from increased competition bringing reduced purchasing costs. Suppliers benefit from having greater access to government purchasing.

Achieving these benefits revolves initially around the willingness to adopt and use performance specifications coupled to performance-based contracting.

Adopting performance specifications and nongovernment standards as the norm is possible. Others do it for equally complex purchases in the commercial environment. DOD is proving it can do likewise. The difficulty, as always, is implementation and reinforcement of the reforms in a large bureaucracy noted for resistance to change. The key to success depends on continued leadership commitment, education, training, and encouragement through reward for those who accept the challenge to make change happen.

The proponent of this pamphlet is the United States Army Materiel Command. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) to Commander, HQ AMC, ATTN: AMCRDA-TE, 5001 Eisenhower Avenue, Alexandria, VA 22333-0001.

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**APPENDIX A**

**The Executive Summary**

**A RADICAL REFORM FOR THE  
DEFENSE ACQUISITION SYSTEM**

from

***NEW THINKING AND AMERICAN DEFENSE TECHNOLOGY***

**A Report of the CARNEGIE COMMISSION  
ON SCIENCE, TECHNOLOGY AND GOVERNMENT**

**May 1993**

## **EXECUTIVE SUMMARY**

The Carnegie Commission on Science, Technology, and Government recommends that the Secretary of Defense undertake, with high priority, a radical reform of the defense acquisition system.

The many studies on defense acquisition agree that the system is bloated and inefficient and have made detailed recommendations on how to improve it, but previous attempts have failed because they tried to build on a fundamentally flawed foundation.

What is needed is a complete break with the present system, and the creation of a new system based on the best of the acquisition processes used by large corporations when they undertake major development projects, such as a new generation of commercial transport aircraft. Such a new system would allow the integration over time of the defense industrial base with the commercial industrial base - an integration that will bring not only major benefits to our national security but also important improvements in the competitive posture of many of our largest corporations. It would also signal an important philosophical shift by the new administration tied to the broader goals of strengthening the national economy and reducing the size of government.

## **THE PROBLEM**

Previous studies by the Defense Science Board, the Grace Commission, the Packard Commission, the Congress, and a number of universities have documented the inefficiencies of the present acquisition process. Congress and the Defense Department, in an effort to eliminate waste, fraud and abuse, have created a myriad of laws and regulations, which in turn have led to thousands of documents describing in elaborate detail how every weapon - and every belt buckle - should be developed and procured. The Defense Department has established an army of several hundred thousand acquisition personnel to oversee the process spelled out in these documents. Industry in turn has added hundreds of thousands of people to their staffs to cope with the government overseers. All of this overhead structure is paid for, one way or another, by the taxpayers.

It is impossible to estimate precisely the full cost of regulation in the present acquisition system; however, a surrogate for regulation cost is the cost of the personnel in DOD and the defense industry dedicated to management and control. That cost in FY 1991 is estimated to be over \$50 billion, or about 40 percent of the acquisition budget for that year. (This compares with management and control burdens in commercial business that range from 5 to 15 percent.) The high overhead costs are not the only problem with the present acquisition process. It also imposes severe schedules penalties - the acquisition schedule that results from this process are two to three times as long as commercial schedules for comparable systems. (The B-2 acquisition schedule, for example, is about three times that of the Boeing 767.) And there are serious

performance penalties as well - nearly all of our military systems embody technology that is a generation or two behind their commercial counterparts.

These well-documented efficiencies, which have plagued us for many years, are compounded by three problems arising from the significant downturn in defense spending now under way and likely to continue for a number of years.

First, as defense spending decreases, the overhead cost of regulation (management and control), which is already about 40 percent of the acquisition budget, would consume as much as 70 percent of that budget if the present overhead control structure were left in place. Both the DOD and defense contractors will need to downsize their management and control staffs at least proportionally to the decreased size of the defense budget. But simple downsizing is not enough; we should also take this opportunity to restructure our defense acquisition process around modern management techniques. During the last few years, our most successful commercial industries have all restructured their manufacturing processes and support teams - based on Total Quality Management concepts, statistical quality control, and just-in-time inventory - in order to achieve increased competitiveness in world markets. Defense should do no less!

Second, while many defense companies have tried to convert to the production of commercial products in response to changes in defense spending, they have been largely unsuccessful because of the overhead burden and inefficient processes that are the legacy of the present defense acquisition process. Defense engineers and managers are among the best in the world, and they could readily develop the capability to compete in commercial markets if they became trained in commercial practices.

Finally, with the downsizing now under way, our defense industrial base will provide too small a base if our country ever needs to reconstitute a major defense production capacity. If that contingency arose, we would have to build on the then-existing commercial/industrial base just as we did at the beginning of World War II. However, our defense equipment and acquisition process is now encumbered by a bewildering array of defense-peculiar standards and processes that have proliferated since World War II and that are incompatible with the processes and standards used by our commercial industry. (Indeed, large corporations that have both a defense and a commercial business currently structure them in separate organizations, usually physically separated, so that the defense processes will not "contaminate" their commercial business.)

## **THE RECOMMENDED SOLUTION**

The reform of the defense acquisition system must have as its principal thrust the integration of the country's defense and commercial industry to create a single industrial base.

Given the expected size of the defense industry in the 1990s, the increased importance of commercial technology to defense, and the need of our commercial industry to get the full benefits of defense technology advances, we can no longer afford the luxury of maintaining two distinct industrial bases.

Achieving this integration requires making a complete break with the present system. The needed reform consists of replacing the current acquisition system with an existing system that needs no new invention and that is used by most companies every day: common commercial buying practices. The critical ingredient of adaptation to commercial practice is conversion from a regulation-based system to a market-based system. Numerous studies have made it clear that the problems with the defense acquisition system are rooted deeply in the regulation-based system of procurement, with its insidious system of "allowable overhead." Such a system is clearly vulnerable to abuse by contractors who are careless about passing unallowable costs on to the government. The government responds to this vulnerability of the public purse by dispatching thousands of inspectors and auditors to oversee defense contractors. These government contractors in turn are matched - on a person-by-person basis at least - by counterpart accountants and auditors employed by industry. Eliminating this fundamental vulnerability to abuse and making drastic reductions in the personnel superstructure that goes with it would reduce defense expenditures by several tens of billions of dollars each year. By way of illustration, if we had been able to reduce the management and control burden in last year's acquisition budget to 20 percent (still more than is typical in commercial practice), \$25 billion would have been saved that year.

The Task Force believes that this is a practical and achievable reform and that a transition from the old system to a new one can be accomplished smoothly. The strategy is to create simply worded legislation and regulation changes that will enable and encourage the Secretary of Defense to apply best commercial practices and gradually withdraw from the present system. To change all of the current contracts, organizations, and procedures of the department immediately would, of course, be impractical. However, it is realistic to begin immediately by permitting commercial practices to be used now where practical. Both the current system and the new price-based, commercial-practice system would operate in parallel for several years as the Department of Defense gradually moves programs, contracts, organizations and procedures into this new mode. It should be possible to move most of the procurement activity to the new process within the first 4-year term of the administration.

To move to a new market-based system must not and need not dilute the government's obligation to assure that it obtains fair value for the taxpayer's money, with equitable treatment for all contractors. The Commission is aware that government procurement will always operate under different constraints from private sector procurements. But under the new system, many tools will continue to be available to the government to meet its unique needs and constraints for spending public monies, which will be at least as effective as the current practice of determining in detail the cost of a product in order

to decide what to pay for it. Competition will continue to be available in most circumstances - it will simply take place on the basis of value rather than cost. Commercial practices contain sensible ways of establishing a fair price. Very importantly, the government has an obligation to understand the value of what it wishes to acquire. Today's archaic and destructive "requirements process" results in neither a real determination of what is required nor any attempt to establish value, and this process should be changed in any event. Managing risk in high-technology programs is now well understood in commercial practice, and there are many mechanisms available to achieve that effectively in the new system. We can and must use these commercial techniques to the public's advantage.

## **IMPLEMENTATION ISSUES**

Implementing this recommendation will be very difficult because the present defense acquisition system is deeply ingrained in practice and law. Long-established ways of doing business would have to be changed; many institutional oxen would be gored. Thus, to effect such a fundamental change will require a major commitment of political capital by the President and the Secretary of Defense to gain the support of the services and the key committees of Congress. Service support would be facilitated if the Secretary of Defense makes clear from the beginning that the basic role of the services in acquisition would be maintained; in other words, this is not a move to centralize defense acquisition and move it away from the users. Congressional support would be facilitated if the President organized a commission, patterned after the "base-closing" commission, to recommend the necessary changes in acquisition law and agency mandates, including phasing down agencies or subagencies where necessary.

This initiative would send an important signal that the new administration is serious about national security as well as economic well-being; indeed, it emphasizes that they are closely interrelated. Successfully implemented, it will result in huge gains in efficiency and effectiveness, and will allow us to establish a strong defense capability while we are making major reductions in defense spending. The effort required would be substantial, but the prize is large - in reduced expenditures, in increased national security, and in the increased strength of our national industrial base.





**APPENDIX B**

**Report of the  
PROCESS ACTION TEAM  
ON  
MILITARY SPECIFICATIONS AND STANDARDS**

**APRIL 1994**

**"A BLUEPRINT FOR CHANGE"**

**The Executive Summary**

## Executive Summary

# Blueprint for Change: Toward a National Production Base

**Vision:** A national defense force that derives strength and technical superiority from a unified commercial/military industrial base. An acquisition process that helps to unify the industrial base by applying the most modern industrial products, processes, practices, and standards of management and manufacturing.

Specifications and standards reform is an integral part of the acquisition reform vision, a vision intended to revolutionize the way the government does business. At the root of the problem are 31,000 military specifications and standards. Over the past 20 years or so, it has been an uphill, and not always successful, struggle to keep these up-to-date in a world of continuous and planned obsolescence. As DOD's budgetary and manpower resources are reduced, however, there is little hope that military specifications and standards can be kept either technically current or on track with commercial practices, products, and processes. The greater the divergence between the commercial and military sectors, the less the likelihood that military products and systems can be purchased from or produced in commercial operations.

DOD cannot afford to pay an increasing "defense-unique" premium for the goods and services it buys. It does not have the wherewithal to subsidize increasingly inefficient defense operations which do not have a self-sustaining market base. As these defense companies downsize, convert, or fail, DOD will lose a significant portion of the industrial base once capable of producing to its specialized requirements.

There are only two ways out of this dilemma. The first is to convert overly prescriptive military specifications and standards into nongovernment standards (NGS), commercial item descriptions (CID), and performance-based specifications and standards--the kinds of documents that will allow suppliers to optimize production capacity and DOD to buy from a unified national production base. The second alternative is to face the prospect of an industrial base that is incapable of sustaining our forces in two major regional conflicts simultaneously.

Unfortunately, there are no universal solutions or overnight panaceas that will convert the military specifications and standards program into a "commercial friendly" system. It is an extremely complex system spanning acquisition needs ranging from nuclear weapons to chocolate chip cookies. There will probably never come a time when all defense needs can be satisfied by commercial operations. However the goal of the Process Action Team (PAT) on Military Specifications and Standards is to maximize the overlap between DOD needs and commercial capabilities. How DOD defines those needs is a critical determinant of the potential for overlap.

The PAT on Military Specifications and Standards developed 24 recommendations addressing all aspects of developing and applying military specifications and standards; 13 are considered to be principal recommendations. These recommendations are divided into chapters addressing: Performance Specifications, Eliminating Excessive Contract Requirements, Overhauling the Standards Process, New Management Tools, The Education Imperative, Instituting Cultural Change, and General Acquisition Reform. These chapters are highlighted below. "Action Agenda" sections are provided for principal recommendations. **Principal recommendations are highlighted in bold print throughout the report.** To facilitate execution of these recommendations, the PAT suggests that Office of the Secretary of Defense (OSD) implementing resources be temporarily assigned to DUSD(AR). Also, the Defense Standards Improvement Council should report to DUSD(AR) until the entire process is well underway.

**Adopt Performance Specifications.** The PAT recommends that performance-based specifications (within this report performance-based specifications refers to both specifications and standards) be used as the method of contracting for new systems, major modifications, technology generation changes, nondevelopmental items, and commercial items. New systems must be described in performance terms, letting the bidders propose the "how-to" details. Military requirements must be written in a way that encourages alternative solutions and reduces DOD oversight. Adoption of performance-based specifications will require up-front investment. Areas that warrant priority attention include engineering and design documentation, the degree of configuration control of the product baseline, and the military-unique manufacturing and management standards that drive up the cost of doing business.

### **Action Agenda**

- **The Deputy Secretary of Defense should direct that all ACAT Programs for new systems, major modifications, technology generation changes, nondevelopmental items, and commercial items shall state needs in terms of performance specifications.**
  - Any deviation from this must be authorized by the Milestone Decision Authority (MDA).
  - Revise DODI 5000.2 to state that to the extent practical, the government should maintain configuration control of the functional and performance requirements only, giving contractors responsibility for the detailed design.
  - Place greater emphasis on the requirement to develop performance specifications.

- Enhance training and disseminate the "Guide for the Preparation and Use of Performance Specifications."
- **The Deputy Secretary of Defense should direct that management and manufacturing standards be canceled or converted to performance or nongovernment standards.**
  - Issue policy stating that nongovernment standards and industry practices that meet the intent of military standards are the preferred alternative.
  - Develop plans to review military management and manufacturing standards that have been identified as the most significant barriers to commercial processes and are real cost drivers. Resulting action is to cancel, inactivate for new design, transfer to nongovernment standards, convert to performance-based specifications, or retain as military unique.

**Eliminate Excessive Contract Requirements.** Requirements find their way onto contracts in a variety of ways, mostly because of a business-as-usual approach. Because the whole objective is to change the way DOD does business, DOD solicitations and contracts must be stripped of non-value-added requirements. Every requirement must be justified.

The PAT's principal recommendations focus on two areas: incentivizing contractors to propose alternatives to military specifications and standards and prohibiting the use of military specifications and standards in solicitations and contracts.

### **Action Agenda**

- **The Deputy Secretary of Defense should direct that all new high value solicitations and ongoing contracts will have a statement encouraging contractors to submit alternative solutions to military specifications and standards.**
  - Encourage contractors with multiple DOD contracts to notify contracting officers when changes to military specifications and standards force them to implement multiple systems in the same facility; and authorize contracting officers to consolidate multiple specifications and standards into single processes.
  - Government contracting officers shall expedite the processing of proposed alternatives to military specifications and standards and are encouraged to use the no-cost settlement method.

- **The Deputy Secretary of Defense should prohibit the use of military specifications and standards for all ACAT Programs except when authorized by the Service Acquisition Executive or designees.**
  - Exemptions granted for performance-based specifications, military unique specifications and standards, no acceptable alternative, or not cost-effective.

**Excessive Referencing:** Excessive referencing in military specifications and standards results in additional cost and makes it difficult to identify actual user needs. Risk aversion, perceived policy requirements, a "that's the way it's always been" attitude, and a belief that more references are better, all contribute to the problem of unnecessary requirements. The PAT recommends changing current referencing practices to ensure military specifications and standards only list references essential to establishing technical requirements.

**Tiering of Specifications:** Current Defense policy addresses the tiering of military specifications and standards. During Concept Exploration and Demonstration/Validation all military specifications and standards are provided for guidance only. During Engineering and Manufacturing Development only direct cited military specifications and standards and first-tier references are mandatory. During Production there is no mandatory cut-off. This policy is frequently violated during development and no cut-off during production is a costly practice. The PAT recommends a solution to this by restricting references in military specifications during all phases of acquisition.

**Obsolete Specifications:** The "Department of Defense Index of Specifications and Standards" and the "Acquisition Management System and Data Requirement Control List" contain outdated military specifications and standards and data requirements that should not be used for new development efforts. The PAT recommends a procedure for identifying and removing these obsolete requirements.

**Overhaul the Standards Process.** The military specifications and standards process itself is obsolete. It was not structured to deal with technology cycles that are measured in months rather than years or decades. Cooperation with industry has not been embedded in the system to ensure that future generations of standards will be technically current. Nor does the system give priority to adopting and implementing nongovernment standards. Unfortunately, this process will be more complicated than just switching mindsets or replacing military specifications and standards with NGSs. In many instances there are no NGS counterparts or at least no adequate counterparts. In some cases, the military standard is the industry standard. Much closer ties with industry and industry standard setting associations will have to be forged.

## Action Agenda

- **The Deputy Secretary of Defense should encourage forming partnerships with industry associations to develop nongovernment standards for the replacement of military standards where practiced.**
  - Adopt and list in the DODISS all nongovernment standards currently being used by DOD.
  - Implement Memoranda of Understanding between DOD and the nongovernment standards bodies to promote the use of nongovernment standards to the maximum extent possible.
  - Establish evaluation teams to review the federal supply classes and standardization areas to identify candidates for conversion or replacement.
  - Establish joint government-industry standards development projects. Promote resultant standards as national or international standards.

**Specifications and Standards Development:** Industry and government users are normally involved in the coordination of draft military specifications and standards; however, they are not typically included in the requirements determination process prior to the coordination process. The PAT recommends a process that will include industry and government users up front in the development and validation process.

**Specifications and Standards Responsibility:** Organizationally, there is a growing mismatch, particularly for commercial items, between the procuring activities and the specifications and standards preparing activities. To facilitate the conversion of military: specifications and standards for commercial type items to procurement practices such as commercial item descriptions, the PAT recommends that specifications and standards preparing responsibility be assigned to the procuring organization.

**Implementing New Management Tools.** New acquisition strategies require new management tools and techniques to quantify read costs and savings, manage risk, reduce the need for oversight, and incorporate greater flexibility into the process. The PAT recommends a number of new management strategies to enhance not only specifications and standards reform but acquisition reform as well.

**Reduce Oversight:** Modern manufacturing systems rely on robust designs and process controls to ensure high quality and reliability. By contrast, DOD practice has been to impose military unique quality assurance standards and to require test and inspection of virtually every parameter (often viewed as an attempt to "inspect" quality into the product). The government could significantly reduce the resources devoted to

quality control testing and inspection and improve quality by substituting process controls and nongovernment standards, such as the ISO 9000 quality series.

### **Action Agenda**

- **The Deputy Secretary of Defense should direct government oversight be reduced by substituting process control and nongovernment standards in place of development/production testing and inspection and military unique quality assurance systems.**
  - Develop and implement changes to DODI 5000.2 and the DFARS. Establish policy indicating that during production contractors are encouraged to use process control techniques and quality systems that comply with commercial standards such as American National Standards Institute (ANSI) Q90 or the ISO 9000 series.
  - Emphasize removing fixed allowable defect level measures from military specifications.
  - Emphasize greater use of process controls.

**Adopt Modern Test and Inspection Techniques:** The need to reform test and inspection procedures goes hand-in-glove with the reliance on performance-based specifications, industry partnering, and modern quality assurance techniques. Current development and production test and inspection requirements do not recognize fully the following techniques that have been proven in the defense and commercial sector: continuous evaluation, simulation, environment testing, dual-use test facilities, process controls, and continuous process improvement.

### **Action Agenda**

- **The Deputy Secretary of Defense should direct a goal of reducing the cost of contractor-conducted development and production test and inspection by using simulation, environment testing, dual-use test facilities, process controls, metrics, and continuous process improvements.**
  - Buying commands and program executive officers/program managers (PEO/PM) retain a portion of the savings to incentivize and accomplish additional savings.
  - Maintain central library data bases of existing high-value government test facilities and make these facilities available to all of DOD and industry for government contracts.

- **Mandate Corporate Information Management Systems for Acquisition:**  
The ability to communicate electronically among industry suppliers and government users and to have electronic libraries of military standards, nongovernment standards, or commercial items is indispensable and is, perhaps, the only way to bring the system into the 21st century

### **Action Agenda**

- **The Deputy Secretary of Defense should assign Corporate Information Management (CIM) offices for specifications and standards preparation and use.**
  - The Acquisition Process CIM (APCIM) will serve as the functional proponent for automated specifications and standards development and automated acquisition aids.
  - The Acquisition Integration CIM (AICIM) will ensure proper integration of all CIM efforts within OUSD (A&T).
- **The Deputy Secretary of Defense should direct the use of automation to improve standards development, adoption, and applications. (Note: There are two recommendations addressing these issues.)**
  - Develop prioritized list of nongovernment standards to be digitized and incorporated into electronic standards libraries.
  - Provide searching, authoring, coordination, feedback, and networking tools to activities that prepare military specifications and standards.
  - Establish a data base of nongovernment standards that are equivalent to military standards.
  - Provide automated expert systems incorporating acquisition reform rules to procuring activities.

**Challenge Acquisition Requirements:** The problem of unique military systems does not begin with the standards; it is rooted in the cost-performance trade-offs and dual-use analyses in the requirements development phase of the acquisition cycle. Although performance estimates for new systems are often quite accurate, other criteria such as cost and schedule are far less reliable by the time the system is ultimately fielded. However new technology tools, such as Distributed Interactive Simulation (DIS), can help reduce these uncertainties by analyzing alternative ways to design and build the system without ever leaving a computer. The virtual reality created by DIS can prioritize requirements by putting the system into simulated combat; it can assess



the cost and performance impacts of substituting commercial components for military-unique ones; and it can identify potential manufacturing problems early in the requirements development process before there is any commitment to specific hardware design. The PAT recommends the use of DIS, Design to Cost, and Cooperative Research and Development Agreements to achieve aggressive cost/performance trade-offs and dual use capability.

**Enhance Pollution Controls:** Military specifications and standards are too often at odds with regional or national environmental pollution goals; they sometimes even require the use of known pollutants although alternatives are available. There is no clear DOD-wide strategy to address pollution prevention issues or to assign responsibility for eliminating toxic pollutants from military specifications and standards. The PAT recommends the establishment and execution of an aggressive program to eliminate or reduce and identify toxic pollutants procured or generated through the use of specifications and standards.

### **The Education Imperative and Instituting Cultural Change.**

There are four fundamental requisites to specifications and standards reform, requisites that transcend the specifics of the implementation plan. These are **training, leadership, management, and funding**. Although there have been many attempts at military specification reform, none have successfully addressed all these critical components of change.

**Training** is the linchpin of cultural change, providing new skills and knowledge to implement a new acquisition paradigm. The acquisition work force must be trained in the tools and techniques of risk management in place of the risk avoidance approach that is today so deeply ingrained in the system.

### **Action Agenda**

- **The Deputy Secretary of Defense should direct revision of the training and education programs to incorporate specifications and standards reform. Contractor participation in this training effort shall be invited and encouraged.**
  - Service acquisition personnel should develop "Defense Acquisition Reform Seminars," patterned on the Army "Road Shows," to train the acquisition work force on the integration of new and existing policies and procedures resulting from acquisition reform initiatives.
  - Institute changes in career progression. Revise courses to incorporate elements of acquisition reform.
  - Expand traditional formal classroom training techniques.

- **Leadership** entails both visibility and strategic planning. Leaders in the OSD must be visible vectors in this process of change. There is no substitute for committed and ongoing leadership. However acquisition reform demands a strategic plan, a vision of where we want to be and how we get there with concrete direction, milestones, and metrics. The OSD and Service and Agency officials charged with implementing the plan should be an integral part of the strategy formulation.

### **Action Agenda**

- **Senior DOD management must perform a major role in establishing the environment essential for acquisition reform culture change.**
  - Direct implementation of the report "Blueprint for Change."
  - Demonstrate senior DOD leadership commitment to Acquisition Reform Initiatives through highly visible and carefully targeted participation in the implementation process.
  - Require and review an annual report tracking the progress of the specifications and standards reform initiatives. This report should include major milestones (which are detailed in the implementation plans of each recommendation), customer surveys, and targeted reductions in DOD oversight of contractors.
  - Incentivize Program Managers to select alternatives solutions to military specifications and standards.

**Management** implies authority, which is lacking in the specifications and standards arena. The individual nominally in charge of the system the Standardization Executive--often has little control over the process and none over the funding allocations. Each local command makes critical decisions on military specifications and standards without the benefit of a DOD corporate or Service strategic plan.

### **Action Agenda**

- **The Deputy Secretary of Defense should formalize the responsibility and authority of the Standards Improvement Executives, provide the authority and resources necessary to implement the standards improvement program within their Service/Agency, and assign a senior official with specifications and standards oversight and policy authority.**

- Standards Improvement Executives to be appointed by the USD(A&T), Service Acquisition Executives. and Director DLA replacing the current Standardization Executives.
- The Standards Improvement Executives will support those carrying out acquisition reform, direct implementation of the military specifications and standards reform program, submit and defend budgets, and participate on the Defense Standards Improvement Council.

**Funding** is the ultimate stumbling block to military specifications and standards reform initiatives. There is, in many specifications and standards offices, no lack of will to reform this system, but no money to do it. Budgets are being zeroed out across the Services, making specifications and standards maintenance, participation on NGS bodies, and adoption of performance-based specifications a virtual impossibility. It may not be feasible to fund this entire reform package at once. However the leadership must ensure that adequate funding levels are met in critical areas.

The PAT vision is to move towards an optimal mix of performance-based specifications, nongovernment standards, commercial item descriptions, and a carefully minimized set of unique military specifications and standards. There are several key elements in the agenda for change.

### **General Acquisition Reform.**

Military specifications and standards are an integral part of the materiel acquisition process. The PAT focused on processes for both the development and use of military specifications and standards. Recommendations were then developed to enhance these processes. The four areas discussed below offer significant opportunity for improving materiel acquisitions; transcending specifications and standards. These are offered for consideration in the overall acquisition reform initiative.

**Commercial Practices:** Traditionally the DOD has used military specifications to purchase items that are almost identical to items purchased by consumers and industry. Military specifications were used to ensure quality, promote competition, and generally satisfy a host of procurement regulations and procedures. The military services and the Defense Logistics Agency have developed a number of innovative procedures that resemble commercial procurement practices for commercial like items. The PAT recommends greater interchange and use of these practices.

**Partnering with Industry:** Performance-based specifications and reduced oversight will require far better working relationships with industry than exist today. The effective use of partnering can improve the nature of "arms-length" transactions, avoiding unnecessary disputes, processes and delays while achieving the interests of the parties to the contract. The PAT recommends broad use of partnering concepts.

**Activity-Based Costing: (ABC):** Conventional cost accounting systems allow overhead costs to be pooled and spread across contracts, blurring the real cost of military requirements on individual product lines. An ABC accounting system, by contrast, generates a direct correlation between costs and activities/processes generated by specific requirements, allowing the program manager to identify and manage key cost-drivers in the acquisition process. The PAT recommends that contractors be encouraged to establish and use activity-based costing and activity-based management.

**Integrated Product Development: (IPD):** IPD is a natural adjunct to performance-based specifications, a risk management tool modeled on best commercial practice. It encourages a multidisciplinary approach to systems engineering, bringing all the functional areas together to address key issues in development, engineering, and production concurrently. The PAT recommends that IPD be the preferred risk mitigation tool for all developmental acquisitions.

The specifications and standards reform plan offered by the PAT for Specifications and Standards is far more comprehensive than can be outlined in an executive summary. The PAT's analyses, recommendations, action agendas, and impact and risk assessments are presented in the chapters that follow.

The specifications and standards reform agenda presented here is not without cost, time, attention, and other resources. In this era of fiscal austerity, it is difficult to propose reinvesting in defense. Nonetheless, specifications and standards is a major component of defense costs perhaps as much as 15 to 20 percent of a \$70 billion research, development and procurement budget. Clearly, this is a sufficiently large portion of the total investment to warrant managing it well.

It is equally clear, however, that the specifications and standards reform is only part of the picture. Without substantial and concomitant change in the contracting process the goal of achieving an efficient, unified national production base will remain an abstract hope.

**APPENDIX C**

29 June 1994

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS  
CHAIRMAN OF THE JOINT CHIEFS OF STAFF  
UNDER SECRETARIES OF DEFENSE  
COMPTROLLER  
ASSISTANT SECRETARY OF DEFENSE (COMMAND, CONTROL,  
COMMUNICATIONS, AND INTELLIGENCE)  
GENERAL COUNSEL  
INSPECTOR GENERAL  
DIRECTOR OF OPERATIONAL TEST AND EVALUATION  
DIRECTORS OF THE DEFENSE AGENCIES  
COMMANDER-IN-CHIEF, U.S. SPECIAL OPERATIONS COMMAND

**SUBJECT:** Specifications & Standards -- A New Way of Doing Business

To meet future needs, the Department of Defense must increase access to commercial state-of-the-art technology and must facilitate the adoption by its suppliers of business processes characteristic of world class suppliers. In addition, integration of commercial and military development and manufacturing facilitates the development of dual-use processes and products and contributes to an expanded industrial base that is capable of meeting defense needs at lower costs.

I have repeatedly stated that moving to greater use of performance and commercial specifications and standards is one of the most important actions that DOD must take to ensure we are able to meet our military, economic, and policy objectives in the future. Moreover, the Vice President's National Performance Review recommends that agencies avoid government-unique requirements and rely more on the commercial marketplace.

To accomplish this objective, the Deputy Under Secretary of Defense (Acquisition Reform) chartered a Process Action Team to develop a strategy and a specific plan of action to decrease reliance, to the maximum extent practicable, on military specifications and standards. The Process Action Team report, "Blueprint for Change," identifies the tasks necessary to achieve this objective. I wholeheartedly accept the Team's report and approve the report's primary recommendation to use performance and commercial specifications and standards in lieu of military specifications and standards, unless no practical alternative exists to meet the user's needs. I also accept the report of the Industry Review Panel on Specifications and Standards and direct the Under Secretary of Defense (Acquisition and Technology) to appropriately implement the Panel's recommendations.

I direct the addressees to take immediate action to implement the Team's recommendations and assign the Under Secretary of Defense (Acquisition and Technology) overall implementation responsibility. I direct the Under Secretary of Defense (Acquisition and Technology) to immediately arrange for reprogramming the funds needed in FY94 and FY95 to efficiently implement the recommendations. I direct the Secretaries of the Military Departments and the Directors of the Defense Agencies to program funding for FY96 and beyond in accordance with the Defense Planning Guidance.

### Policy Changes

Listed below are a number of the most critical changes to current policy that are needed to implement the Process Action Team's recommendations. These changes are effective immediately. However, it is not my intent to disrupt on-going solicitations or contract negotiations. Therefore, the Component Acquisition Executive (as defined in Part 15 of DOD Instruction 5000.2), or a designee, may waive the implementation of these changes for on-going solicitations or contracts during the next 180 days following the date of this memorandum. The Under Secretary of Defense (Acquisition and Technology) shall implement these policy changes in DOD Instruction 5000.2, the Defense Federal Acquisition Regulation Supplement (DFARS), and any other instructions, manuals, regulations, or policy documents, as appropriate.

**Military Specifications and Standards:** Performance specifications shall be used when purchasing new systems, major modifications, upgrades to current systems, and non-developmental and commercial items, for programs in any acquisition category. If it is not practicable to use a performance specification, a non-government standard shall be used. Since there will be cases when military specifications are needed to define an exact design solution because there is no acceptable non-governmental standard or because the use of a performance specification or non-government standard is not cost effective, the use of military specifications and standards is authorized as a last resort, with an appropriate waiver.

Waivers for the use of military specifications and standards must be approved by the Milestone Decision Authority (as defined in Part 2 of DOD Instruction 5000.2). In the case of acquisition category ID programs, waivers may be granted by the Component Acquisition Executive, or a designee. The Director, Naval Nuclear Propulsion shall determine the specifications and standards to be used for naval nuclear propulsion plants in accordance with Pub. L. 98-525 (42 U.S.C. §7158 note). Waivers for procurement of items already in the inventory are not required. Waivers may be made on a "class" or items basis for a period of time not to exceed 2 years.

**Innovative Contract Management:** The Under Secretary of Defense (Acquisition and Technology) shall develop, within 60 days of the date of this memorandum, Defense Federal Acquisition Regulation Supplement (DFARS) language to encourage contractors to propose non-government standards and industry-wide practices that meet the intent of the military specifications and standards. The Under Secretary will make this language effective 180 days after the date of this memorandum. This language will be developed for inclusion in both requests for proposal and in on-going contracts. These standards and practices shall be considered as alternatives to those military specifications and standards cited in all new contracts expected to have a value of \$100,000 or more, and in existing contracts of \$500,000 or more having a substantial contract effort remaining to be performed.

Pending completion of the language, I encourage the Secretaries of the Military Departments and the Directors of the Defense Agencies to exercise their existing authority to use solicitation and contract clause language such as the language proposed in the Process Action Team's report. Government contracting officers shall expedite the processing of proposed alternatives to military specifications and standards and are encouraged to use the Value Engineering no-cost settlement method (permitted by FAR 48.104-3) in existing contracts.

**Program Use of Specifications and Standards:** Use of specifications and standards listed in DOD Instruction 5000.2 is not mandatory for Program Managers. These specifications and standards are tools available to the Program Manager, who shall view them as guidance, as stated in Section 6-Q of DOD Instruction 5000.2.

**Tiering of Specification and Standards:** During production, those system specifications, subsystem specifications and equipment/product specifications (through and including the first-tier reference in the equipment/product specifications) cited in the contract shall be mandatory for use. Lower tier references will be for guidance only, and will not be contractually binding unless they are directly cited in the contract. Specifications and standards listed on engineering drawings are to be considered as first-tier references. Approval of exceptions to this policy may only be made by the Head of the Departmental or Agency Standards Improvement Office and the Director, Naval Nuclear Propulsion for specifications and drawings used in nuclear propulsion plants in accordance with Pub. L. 98-525 (42 U.S.C. §7158 Note).

### **New Directions**

**Management and Manufacturing Specifications and Standards:** Program Managers shall use management and manufacturing specifications and standards for guidance only. The Under Secretary of Defense (Acquisition and Technology) shall develop a plan for canceling these specifications and standards, inactivating them for new designs, transferring the specifications and standards to non-government standards, converting them to performance-based specifications, or justifying their retention as military specifications and standards. The plan shall begin with the ten management and manufacturing standards identified in the Report of the Industry Review Panel on Specifications and Standards and shall require completion of the appropriate action, to the maximum extent practicable, within 2 years.

**Configuration Control:** To the extent practicable, the Government should maintain configuration control of the functional and performance requirements only, giving contractors responsibility for the detailed design.

**Obsolete Specifications:** The "Department of Defense Index of Specifications and Standards" and the "Acquisition Management System and Data Requirements Control List" contain outdated military specifications and standards and data requirements that should not be used for new development efforts. The Under Secretary of Defense (Acquisition and Technology) shall develop a procedure for identifying and removing these obsolete requirements.

**Use of Non-Government Standards:** I encourage the Under Secretary of Defense (Acquisition and Technology) to form partnerships with industry associations to develop non-government standards for replacement of military standards where practicable. The Under Secretary shall adopt and list in the "Department of Defense Index of Specifications and Standards" (DODISS) non-government standards currently being used by DOD. The Under Secretary shall also establish teams to review the federal supply classes and standardization areas to identify candidates for conversion or replacement.

**Reducing Oversight:** I direct the Secretaries of the Military Departments and the Directors of the Defense Agencies to reduce direct Government oversight by substituting process controls and non-government standards in place of development and/or production testing and inspection and military-unique quality assurance systems.

### **Cultural Changes**

Challenge Acquisition Requirements: Program Managers and acquisition decision makers at all levels shall challenge requirements because the problem of unique military systems does not begin with the standards. The problem is rooted in the requirements determination phase of the acquisition cycle.

Enhance Pollution Controls: The Secretaries of the Military Departments and the Directors of the Defense Agencies shall establish and execute an aggressive program to identify and reduce or eliminate toxic pollutants procured or generated through the use of specifications and standards.

Education and Training: The Under Secretary of Defense (Acquisition and Technology) shall ensure that training and education programs throughout the Department are revised to incorporate specifications and standards reform.

Program Reviews: MDA review of programs at all levels shall include consideration of the extent streamlining, both in the contract and in the oversight process, is being pursued. The MDA (i.e., the Component Acquisition Executive or his/her designee, for all but ACAT 1D programs) will be responsible for ensuring that progress is being made with respect to programs under his/her cognizance.

Standards Improvement Executives: The Under Secretary the Secretaries of the Military Departments, and the Director of the Defense Logistics Agency shall appoint Standards Improvement Executives within 30 days. The Standards Improvement Executives shall assume the responsibilities of the current Standardization Executives, support those carrying out acquisition reform, direct implementation of the military specifications and standards reform program, and participate on the Defense Standards Improvement Council. The Defense Standards Improvement Council shall be the primary coordinating body for the specification and standards program within the Department of Defense and shall report directly to the Assistant Secretary of Defense (Economic Security). The Council shall coordinate with the Deputy Under Secretary of Defense (Acquisition Reform) regarding specification and standards reform matters, and shall provide periodic progress reports to the Acquisition Reform Senior Steering Group, who will monitor overall implementation progress.

### **Management Commitment**

This Process Action Team tackled one of the most difficult issues we will face in reforming the acquisition process. I would like to commend the team, composed of representatives from all of the Military Departments and appropriate Defense Agencies, and its leader, Mr. Harold Griffin, for a job well done. In addition, I would like to thank the Army, and in particular, Army Materiel Command, for its administrative support of the team.

The Process Action Team's report and the policies contained in this memorandum are not a total solution to the problems inherent in the use of military specifications and standards; however, they are a solid beginning that will increase the use of performance and commercial specifications and standards. Your leadership and good judgment will be critical to successful



implementation of this reform. I encourage you and your leadership teams to be active participants in establishing the environment essential for implementing this cultural change.

This memorandum is intended only to improve the internal management of the Department of Defense and does not create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the Department of Defense or its officers and employees.

/s/

William J. Perry



**APPENDIX D****Signal Corps Specification No. 486  
Advertisement and Specification for a  
Heavier-than-Air Flying Machine****TO THE PUBLIC**

Sealed proposals, in duplicate, will be received at this office until 12 o'clock noon on February 1, 1908, on behalf of the Board of Ordnance and Fortification for furnishing the Signal Corps with a heavier-than-air flying machine. All proposals received will be turned over to the Board of Ordnance and Fortification at its first meeting after February 1 for its official action.

Persons wishing to submit proposals under this specification can obtain the necessary forms and envelopes by application to the Chief Signal Office, United States Army, War Department, Washington, D.C. The United States reserves the right to reject any and all proposals.

Unless the bidders are also the manufacturers of the flying machine they must state the name and place of the maker.

Preliminary - This specification covers the construction of a flying machine supported entirely by the dynamic reaction of the atmosphere and having no gas bag.

Acceptance - The flying machine will be accepted only after a successful trial flight, during which it will comply with all requirements of this specification. No payments on account will be made until after the trial flight and acceptance.

Inspection - The Government reserves the right to inspect any and all processes of manufacture.

**GENERAL REQUIREMENTS**

The general dimensions of the flying machine will be determined by the manufacturer, subject to the following conditions:

1. Bidders must submit with their proposals the following:

- (a) Drawings to scale showing the general dimensions and shape of the flying machine which they propose to build under this specification.
- (b) Statement of the speed for which it is designed.
- (c) Statement of the total surface area of the supporting planes.

(d) Statement of the total weight.

(e) Description of the engine which will be used for motive power.

(f) The material of which the frame, planes, and propellers will be constructed. Plans received will not be shown to other bidders.

2. It is desirable that the flying machine should be designed so that it may be quickly and easily assembled and taken apart and packed for transportation in army wagons. It should be capable of being assembled and put in operating condition in about 1 hour.

3. The flying machine must be designed to carry two persons having a combined weight of about 350 pounds, also sufficient fuel for a flight of 125 miles.

4. The flying machine should be designed to have a speed of at least 40 miles per hour in still air, but bidders must submit quotations in their proposals for cost depending upon the speed attained during the trial flight, according to the following scale:

44 miles per hour, 140 percent.  
43 miles per hour, 130 percent.  
42 miles per hour, 120 percent.  
41 miles per hour, 110 percent.  
40 miles per hour, 100 percent.  
39 miles per hour, 90 percent.  
38 miles per hour, 80 percent.  
37 miles per hour, 70 percent.  
36 miles per hour, 60 percent.  
Less than 36 miles per hour rejected.

5. The speed accomplished during the trial flight will be determined by taking an average of the time over a measured course of more than five miles, against and with the wind. The time will be taken by a flying start, passing the starting point at full speed at both ends of the course. This test subject to such additional details as the Chief Signal Officer of the Army may prescribe at the time.

6. Before acceptance a trial endurance flight will be required of at least 1 hour during which time the flying machine must remain continuously in the air without landing. It shall return to the starting point and land without any damage that would prevent it immediately starting upon another flight. During this trial flight of 1 hour it must be steered in all directions without difficulty and at all times under perfect control and equilibrium.

7. Three trials will be allowed for speed as provided for in paragraphs 4 and 5. Three trials for endurance as provided for in paragraph 6, and both tests must be completed within a period of 30 days from the date of delivery. The expense of the tests to be borne by the manufacturer. The place of delivery to the Government and trial flights will be at Fort Myer, Virginia.

8. It should be so designed as to ascend in any country which may be encountered in field service. The starting device must be simple and transportable. It should also land in a field without requiring a specially prepared spot and without damaging its structure.

9. It should be provided with some device to permit a safe descent in case of an accident the propelling machinery.

10. It should be sufficiently simple in its construction and operation to permit an intelligent man to become proficient in its use within a reasonable length of time.

11. Bidders must furnish evidence that the Government of the United States has the lawful right to use all patented devices or appurtenances which may be part of the flying machine, and that the manufacturers of the flying machine are authorized to convey the same to the Government. This refers to the unrestricted right to use the flying machine sold to the Government, but does not contemplate the exclusive purchase of patent rights for duplicating the flying machine.

12. Bidders will be required to furnish with their proposal a certified check amounting to 10 percent of the price stated for the 40-mile speed. Upon making the award for this flying machine these certified checks will be returned to the bidders and the successful bidder will be required to furnish a bond according to Army Regulations, of the amount equal to the price stated for the 40-mile speed.

13. The price quoted in proposals must be understood to include the instruction of two men in the handling and operation of this flying machine. No extra charge for this service will be allowed.

14. Bidders must state the time which will be required for delivery after receipt of order.

/s/

JAMES ALLEN,  
Brigadier General,  
Chief Signal Officer of the Army  
SIGNAL OFFICE

**APPENDIX E**

**Example  
of a  
MIL-STD-961D-Style  
Component PRF Specification**

(THE REMAINDER OF APPENDIX IS ON ANOTHER DOCUMENT)

## APPENDIX F

### EXAMPLE

#### **System-Unique Performance Specification** **MORTAR FIRE CONTROL SYSTEM (MFCS)**

#### 1.0 Scope

1.1 Identification. This specification covers the Mortar Fire Control System (MFCS).

1.2 System Description. The MFCS is a platoon level digitally integrated fire control system consisting of position/navigation, weapon pointing (weapon applications only), ballistic computation, digital communications, and situational awareness capabilities. The MFCS includes such brackets and cables necessary to interface with the host vehicle. The MFCS is an add-on system to already fielded mortar systems and FDC vehicles.

1.3 System Overview. There are five (5) applications of the MFCS: 1) M577 tracked Fire Direction Center (FDC), 2) HMMWV FDC, 3) M1064 120mm tracked mortar, 4) M120 120mm towed mortar, and 5) M252 81mm ground mounted mortar. Unless otherwise specified, the requirements pertain to all applications.

#### 1.4 Definitions

1.4.1 Emplaced: Any mortar system that is prepared for operation.

1.4.2 Carrier mounted: M1064 120mm tracked mortar system in its vehicle emplaced configuration, prepared for operation.

1.4.3 Ground mounted: Any mortar system in its ground emplaced configuration, prepared for operation.

1.4.4 Transport mode: Any mortar system in its stowed configuration, whether in a vehicle or on a trailer, prepared for movement.

1.4.5 FDC Node: Any FDC application of the MFCS installed and operational on its host platform.

1.4.6 Weapon Node: Any weapon application of the MFCS installed and operational on its host weapon system.

#### 2.0 Applicable Documents

##### 2.1 Government documents

2.1.1 Specifications, standards and handbooks. The following specifications, standards and handbooks of the exact revision listed below form a part of this specification to the extent specified.

MIL-STD-188-220A, Interoperability Standard for Digital Message Transfer Device Subsystems, 28 Feb 1995

2.1.2 Other Government documents, drawings and publications. The following Government documents, drawings and publications form a part of this specification to the extent specified. Unless otherwise specified, the issues are those in effect on the date of the solicitation.

Department of the Army C4I Technical Architecture, 12 Nov 96  
Joint VMF Technical Design Plan  
XM30 Mortar Ballistic Computer System Specification, 9 February 1996, Part Numbers 12961306 and SVD-LCSE-960056 (Software Version Description)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited, the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless there is a specific exemption.

### 3.0 Requirements

3.1 First Article. When specified, samples shall be subject to first article inspection.

3.2 Design, materials, and manufacturing processes. Unless otherwise specified, the design, materials, and manufacturing process is the prerogative of the contractor as long as all articles submitted to the government fully meet the operating, interface, ownership and support, and operating environment requirements.

3.3 Operating Requirements. Each MFCS shall provide the following functional, operational, and performance capabilities.

3.3.1 Devices. The MFCS shall make maximum use of existing components and materials, and shall leverage existing manufacturing technologies. The MFCS devices shall not impair any crew functions, affect weapon/ammunition performance, or impact the number of stowed rounds. Devices shall be common between the different applications of the MFCS to the maximum extent possible. The device minimum commonality baseline (MCB) is as shown in Table I.



Table I: Device MCB

Component	Applicability
To be provided as part of the proposal	To be provided as part of the proposal
To be provided as part of the proposal	To be provided as part of the proposal
To be provided as part of the proposal	To be provided as part of the proposal
To be provided as part of the proposal	To be provided as part of the proposal

3.3.1.1 Pointing Device. A pointing device (weapon applications only) shall measure and output weapon pointing data both in the emplaced and transport modes, whether stationary or moving. The pointing device assembly shall allow crew replacement and alignment with the weapon tube while in the field. The pointing device shall not be susceptible to the effects of magnetic aberrations, jamming, or masking.

3.3.1.2 Commander's Interface. The MFCS shall have a commander's interface that shall be dismountable from the vehicle when the weapon is ground mounted. The interface shall consist of, at a minimum, a display and input device that allows the commander to interoperate with the MFCS.

3.3.1.3 Driver's Display. The MFCS shall have a driver's display for in vehicle operation only.

3.3.1.4 Gunner's Display. The MFCS shall have a gunner's display (weapon applications only) readable while adjusting the weapon whether the weapon is carrier mounted or ground mounted.

3.3.1.5 Commander's Call. The MFCS shall provide a signaling device for the commander with adjustable tactile and audio alert capabilities.

### 3.3.2 Mission Critical Computer Resources (MCCR).

3.3.2.1 General. All MCCR shall be modular, flexible, re-usable, reliable, rugged, and allow for growth.

3.3.2.2 Software. The MFCS shall make maximum use of existing software. All commercial and nondevelopmental software requires government approval. All resident software shall be externally reprogrammable.

3.3.2.3 Operating System. A commercial operating system is desirable. The operating system shall support, in addition to MFCS functions, multiprocessing, word processing, spreadsheet, email, FTP, Telnet, 3.5 floppy, CD-ROM, 2 PCMCIA devices, modem, and remote dial-up. The operating system shall support remote application control, which shall allow training and diagnostic maintenance of the MFCS by Government or contractor personnel via modem.

3.3.2.4 Hardware. The size and configuration of the computer hardware shall support the software. All RAM and disk memory shall accommodate at least 500 percent expansion. The processing resource margins (throughput) shall be at least 100 percent. Internal and external bus loading shall not exceed 50 percent of the total capability.

3.3.2.5 Interfaces. MFCS components shall interface to each other via a wireless network when ground mounted.

### 3.3.3 Performance

3.3.3.1 Initialization. The MFCS shall initialize and be fully operational within 10 minutes of power-up.

#### 3.3.3.2 Power.

3.3.3.2.1 MFCS components shall have an internal power source capable of at least 12 hours of continuous use. Replacement of the power source shall not require re-initialization of components or cause loss of data.

3.3.3.2.2 Each MFCS component shall be capable of being powered by and recharged from  $24\pm6$ VDC vehicle power, 110VAC 50-60 Hz, and 220VAC 50-60 Hz. All power supplies shall provide protection against reverse polarity and power surges. The MFCS shall remain fully operational during vehicle starting.

3.3.3.3 Displays. The MFCS shall display data to the commander, gunner, and driver.

3.3.3.3.1 The commander's display shall provide graphics and text that shall include fire mission data, position, heading, message queues, maps, situational awareness, and any other information needed to conduct tactical and technical operations.

3.3.3.3.2 The gunner's display (weapon applications only) shall show the selected ammunition, number of rounds, method of control, weapon adjustments, and any other data needed to implement the commanded gun orders.

3.3.3.3.3 The driver's display shall show vehicle position, heading, and "steer to" information.

3.3.3.4 Location and Navigation. The MFCS shall locate itself to an accuracy of 10 meters Circular Error, Probable (CEP), and provide the driver and vehicle commander with current heading and steer to guidance to an accuracy of 50 mils.

### 3.3.3.5 Army Technical Architecture Compliance

3.3.3.5.1 The MFCS shall comply with applicable portions of the Army C4I Technical Architecture.

3.3.3.5.2 The MFCS shall support the protocols defined by MIL-STD-188-220A and the message formats defined in the Joint VMF Technical Interface Design Plan (TIDP).

3.3.3.5.3 The MFCS shall be compatible with the field artillery fire support command and control architecture in the fire support elements at brigade and battalion, the fire support team (FIST), and target acquisition sources.

3.3.3.5.4 The MFCS shall integrate Appliqué/FBCB2 built by PM Appliqué, Program Executive Office Command, Control and Communication Systems (PEO C3S), and operate on the Tactical Internet.

### 3.3.3.6 Operational Concepts

3.3.3.6.1 The MFCS shall meet all requirements specified in XM30 MBC part numbers 12961306 and SVD-LCSE-960056. When a conflict exists, the MFCS Performance Specification shall take precedence.

3.3.3.6.2 The MFCS shall execute and support all doctrinal mortar missions and operations.

3.3.3.6.3 The MFCS shall allow the mortar platoon to execute up to six (6) simultaneous time on target missions, mass time on target fires of six (6) widely dispersed guns on a single target, or execute any combination thereof (e.g., two guns firing one target, three guns firing a second target, and one gun firing a third target concurrently).

3.3.3.6.4 Any of the weapon nodes shall be able to assume the additional functions and responsibilities of the FDC at any time. Thus, the MFCS shall allow the platoon to operate with all six (6) guns under the control of one FDC, as up to six (6) autonomous guns, or in any combination thereof.

3.3.3.6.5 The MFCS shall operate in all weather conditions, both day and night, and during periods of limited or no visibility without degradation.

3.3.3.6.6 The MFCS shall perform all functions while either emplaced or in transport mode, whether stationary or moving (except weapon firing, which is only done while emplaced).

3.3.3.6.7 The mortar crew shall be able to emplace, perform weapon laying, execute fire missions, and displace without having to egress the vehicle (tracked vehicle only).

3.3.3.6.8 The MFCS system shall not degrade the ability of the platoon to use current fire control equipment and procedures concurrently.

### 3.3.3.7 Situational Awareness

3.3.3.7.1 The MFCS shall receive and display any digitally available situational awareness information to the commander and shall enable operator interaction with the situational awareness system.

3.3.3.7.2 The MFCS shall automatically update the situational awareness system of its location on a regular basis.

3.3.3.7.3 The MFCS shall compare all target data to friendly locations as reported through situational awareness, warn the operator of potential hazards to friendly assets, and prevent the execution of the mission without operator override.

### 3.3.3.8 Tactical Fire Control

3.3.3.8.1 The MFCS shall have primary tactical fire control responsibility at the FDC nodes and backup responsibility at the weapon nodes.

3.3.3.8.2 The MFCS shall have the capability to store, retrieve and execute up to three (3) fire plans.

3.3.3.8.3 The MFCS shall have the capability to process a minimum of six (6) concurrent fire missions.

3.3.3.8.4 All MFCS nodes performing tactical fire control shall warn the operator if any target violates a fire support coordination measure or endangers a friendly location.

3.3.3.8.5 All MFCS nodes performing tactical fire control shall provide a weapon call for fire ready for transmission to the weapons within 10 seconds of activation of the fire mission.

3.3.3.8.6 The MFCS shall advise the operator if a call for fire is received on a target that is currently under engagement.

3.3.3.8.7 Weapon nodes shall update their operational status to the FDC node both automatically and upon request.

3.3.3.8.8 The MFCS shall maintain an ammunition status of all weapons under its control to facilitate their resupply.

3.3.3.8.9 The MFCS shall automatically debit the ammunition inventory upon firing. The MFCS shall allow the operator to manually edit the ammunition inventory (e.g. resupply, physical audit, etc.). The MFCS shall automatically provide weapon node ammunition inventories to the FDC node at the appropriate times (e.g., End of Mission, ammunition resupply, and upon request). The MFCS shall automatically provide ammunition status updates to AFADTS. The MFCS shall automatically request ammunition resupply at the reorder point through the Appliqué/FBCB2 CSS software.

3.3.3.8.10 The MFCS shall log and store event data for the last 25 missions or four (4) hours in that order.

3.3.3.8.11 The MFCS shall enable the operator to rapidly clear system data to prevent enemy use.

### 3.3.3.9 Technical Fire Control

3.3.3.9.1 The MFCS shall have primary technical fire control responsibility at the weapon nodes and backup responsibility at the FDC nodes.

3.3.3.9.2 The MFCS shall calculate ballistic solutions for all U.S. mortar ammunition to an accuracy of 10 meters (radially) of the true ballistic solution.

3.3.3.9.3 All MFCS nodes shall warn the operator if any ballistic solution violates a fire support coordination measure or endangers a friendly location.

3.3.3.9.4 FDC nodes performing technical fire control shall provide a ballistic solution ready for transmission to the weapons within 10 seconds of activation of the fire mission.

3.3.3.9.5 Weapon nodes shall provide a ballistic solution and pointing reference to the commander and gunner within 10 seconds of activation of the fire mission.

3.3.3.9.6 All MFCS nodes shall access and use a common time standard for time on target synchronization.

3.3.3.9.7 The MFCS shall receive, store and apply digital meteorological data.

### 3.3.3.10 Weapon Operation.

3.3.3.10.1 Weapon Emplacement (Rough Lay).

3.3.3.10.1.1 Weapon nodes shall provide the driver and commander the required azimuth of lay and steer to guidance within 2 seconds of receipt of a fire mission while on the move.

3.3.3.10.1.2 Weapon nodes shall provide data to align the mortar tube to within 20 mils of the commanded azimuth of lay during the initial emplacement of the mortar.

### 3.3.3.10.2 Precision Lay

3.3.3.10.2.1 Weapon nodes shall have the capability of determining weapon tube alignment to within three (3) mils in azimuth (one (1) mil desired) and one (1) mil in elevation of the true tube position without mortar leveling in any axis. Determination of weapon tube alignment, at the required accuracy, shall be available continuously during the laying procedure.

3.3.3.10.2.2 Weapon node gunner's displays shall indicate textually and graphically the amount of left/right azimuth adjustment and an up/down elevation adjustment necessary to align the tube with the commanded gun orders.

3.3.3.10.2.3 The pointing device shall have an independent display of the current mortar tube azimuth and elevation visible to the gunner while adjusting the weapon thereby providing backup if the gunner's display becomes unavailable.

3.3.3.10.2.4 All displays shall be continuously updated at a minimum rate of 4 hertz to reflect actual tube position in real time. A refresh rate of 15 Hz is desired.

3.3.3.10.3 Carrier Mounted Operations. During carrier mounted operations, the MFCS shall enable the M1064 to emplace, fire, and displace within 1 minute. The MFCS shall be capable of performing the aforementioned tasks between successive rounds or volleys in a single mission.

3.3.3.10.4 Ground Mounted Operations. All ground mounted configurations shall have the same fire control capabilities as the carrier mounted configuration. In addition, there shall be no loss of data or alignment during emplacement or displacement, whether in transition to or from transport mode, or between carrier mounted and ground mounted configuration.

3.3.3.11 Lateral Backup. The MFCS shall be capable of controlling three (3) sections of up to six (6) mortars during lateral backup operations.

3.3.3.12 Other Requirements.

3.3.3.12.1 Digital Mapping. The MFCS shall be able to receive, store, and display digital mapping information.

3.3.3.12.2 Printer. The MFCS shall have the ability to print any and all data (OPLANS, maps, fire mission data, mission logs, etc.).

3.3.3.12.3 The commander's call shall activate when an incoming digital message is received.

3.3.3.12.4 All MFCS nodes shall have the ability to retransmit (forward) digital data to other nodes.

3.3.3.12.5 Inductive Fuze Setter. The MFCS shall have the physical and software interfaces to incorporate the Portable Inductive Artillery Fuze Setter (PIAFS) in the future.

3.4 Interface Requirements. Each MFCS shall accommodate the following inputs and interfaces.

3.4.1 Radio Interface. The MFCS shall interface to SINCGARS radios in the vehicle, when either carrier mounted or in transport mode, and shall interface to SINCGARS manpacks when ground mounted. MFCS shall interface to EPLRS.

3.4.2 Connector Protection. When not coupled, all external connector interiors shall have protection from damage in the environmental environment. If the protection is covers or caps, they shall attach to the host component to prevent loss.

3.4.3 Weight. The maximum weight for the total system shall be 20 kilograms. The maximum weight of any one component of the system shall be 7 kilograms.

3.4.4 Mounting. Mounting to the weapon shall require no weapon modification and shall not prohibit concurrent use of current fire control equipment and procedures. The MFCS shall allow performance of any required vehicle modifications in the field.

3.4.5 Cables. All cables and connections shall not impair the function and mobility of the host system and its operators.

3.4.6 Display Visibility. When powered, the displays, including data entry keys and all applicable lettering and numbering, shall be legible under all light conditions. The commander's display shall be 256 color and 800 x 600 pixel resolution or better. Other displays may be monochrome. Character font size on all developmental displays shall be 4mm or larger. The MFCS displays shall not be susceptible to fogging.

3.4.7 Camouflage. The MFCS shall contribute to field camouflage through color selection and reflectance of all externally visible components.

3.5 Ownership and Support Requirements. Each MFCS shall possess the following life cycle ownership characteristics.

3.5.1 Reliability. The mean time between mission failures shall be greater than 440 system operating hours in the operational environment. The MFCS shall automatically track total operating hours and operating hours between failures.

3.5.2 Maintainability. The MFCS Mean-Time-To-Repair (MTTR) The MFCS MTTR shall be not greater than a specified Mean-Corrective-Maintenance-Time of 60 minutes at the Organization level and 120 minutes at the Direct Support level with a confidence level of 95 percent. The Mmax (percentile of repair time) at the 95th percentile of all corrective tasks time shall be less than 90 minutes at the Organization level, 180 minutes at the Direct Support level and 150 minutes at the General Support level. The MFCS shall automatically record maintenance actions.

3.5.2.1 Tools. The MFCS shall require no special tools for any maintenance operation.

3.5.2.2 Support Equipment. The MFCS shall require no special support equipment for any unit maintenance operation or any peculiar support equipment for any field maintenance.

3.5.2.3 Built In Test. The MFCS shall have an embedded diagnostics/prognostic Built-in Test/Built-in Test Equipment (BIT/BITE) capability that isolates faults down to a level consistent with the MFCS maintenance concept. Embedded diagnostics success probability shall be greater than 0.95 at a 0.90 confidence level for faults designed for isolation and detection.

3.5.2.4 Finish. The MFCS finish shall be nonreflective, corrosion resistant, and not subject to galvanic reaction. The MFCS finish shall be a subdued color such as dark green, brown, black, etc. The MFCS finish may remain the color from manufacturing as long as the surface remains nonreflective.

3.5.3 Manpower and Personnel Integration (MANPRINT)

3.5.3.1 Manpower. The MFCS shall not require any increase in crew or maintenance manpower.

3.5.3.2 Personnel. The MFCS shall not require any qualitative changes in personnel, new MOS, or ASI.



3.5.3.3 Human Factors. The MFCS shall allow installation, testing, operation, and maintenance by the 5th to the 95th percentile environmentally clothed (arctic and MOPP IV) target audience soldier. All controls and displays shall ensure both safe and efficient user operation. Controls and displays shall prevent accidental actuation and out of sequence operations. Completion of critical human tasks shall be successfully accomplished with a 95 percent probability.

3.5.3.4 Training. The MFCS shall provide embedded training (ET) capability to include emplacement, fire mission processing and execution, displacement, and file maintenance. The MFCS shall also function as a training device both in the classroom and during field training exercises. The ET capability shall be adequate to conduct pretest training for operational testing, fielding and sustainment. The ET system shall be transparent to the crew as a result of system hardware/software design. The ET system shall be interoperable with all Combat Training Center instrumentation and training systems (e.g., MILES, MILES 2000, SAWE-RF) for gunnery training and for ensuring effective and responsive mortar collective training. The MFCS shall provide an electronic interface between the MFCS and the Fire Support Combined Arms Tactical Training at Ft Leavenworth, Kansas.

3.5.3.5 Safety. The MFCS shall not expose operators or firing section personnel to routine electrical or mechanical hazards.

3.5.3.6 Health Hazards. The use and maintenance of the MFCS shall not present any health hazards to personnel.

3.5.3.7 Soldier Survivability.

3.5.3.7.1 The MFCS shall reduce the likelihood of enemy counterfire, and reduce operator physical and mental fatigue.

3.5.3.7.2 The MFCS shall reduce the risk of fratricide by applying fire coordination measures and situational awareness.

3.5.3.7.3 The MFCS shall minimize detection by enemy personnel using Generation III image intensification night vision devices.

3.5.3.7.4 The MFCS shall survive Nuclear, Biological, and Chemical (NBC) contamination/decontamination. NBC contamination remaining on, desorbed from, or re-aerosolized from exposed surfaces after decontamination using standard field decontaminates, equipment, and procedures, shall result in no more than a negligible risk to unprotected personnel working one (1) meter from the system.

#### 3.5.4 Transportability.

3.5.4.1 The MFCS shall meet the transportability requirements for each host platform using existing land, sea, and air transportation modes.

3.5.4.2 The ground mounted MFCS shall be operational after air drop.

3.6 Operating Environmental Requirements. The MFCS shall operate under the following environmental conditions without damage or loss of performance.

3.6.1 High Temperature. The MFCS shall operate at 145 degrees F and after storage at 150 degrees F.

3.6.2 Low Temperature. The MFCS shall operate at -40 degrees F and after storage at -50 degrees F.

3.6.3 Thermal Shock. The MFCS shall operate during temperature changes from -25 degrees F to 70 degrees F in 10 minutes and from 120 degrees F to 70 degrees F in 10 minutes.

3.6.4 Solar Radiation. The MFCS shall operate during exposure to 355 BTU per square foot.

3.6.5 Humidity. The MFCS shall operate during exposure of 240 hours at a relative humidity of 94 +/- 5% from 68 degrees F to 125 degrees F.

3.6.6 Shock. The MFCS and each of its components, while installed in its respective areas, shall operate during and after exposure to shock levels typical of the mortar firing (covering all round/charge combinations).

3.6.7 Vibration. The MFCS and each of its components, while installed in its respective areas, shall operate during and after exposure to vibration levels typical of the host system.

3.6.8 Altitude. The MFCS shall operate at altitudes up to 10,000 feet and after exposure to altitudes up to 30,000 feet.

3.6.9 Rain. The MFCS shall operate during exposure to 2.0 inches per hour wind driven rain.

3.6.10 Salt Fog. The MFCS operate during 48 hours of continuous exposure to salt fog.

3.6.11 Sand. The MFCS shall operate during 36 hours of exposure to wind driven sand.

3.6.12 Dust. The MFCS shall operate during 36 hours of exposure to wind driven dust.

3.6.13 Fungus. The MFCS shall operate during 28 days of exposure to tropical climate fungus, rot, or mildew.

3.6.14 Electromagnetic Environmental Effects (E3). Electromagnetic environments shall not degrade the MFCS.

3.6.15 Electrostatic Discharge (ESD). ESD generated by personnel, helicopter transportation, and other sources shall not degrade the MFCS.

3.6.16 Electromagnetic Requirements, Operational (EMRO). The electromagnetic environment produced by radar, communications, and other electronic equipment shall not degrade the MFCS.

3.6.17 Electromagnetic Interference/Compatibility (EMI/EMC). EMI shall not degrade the MFCS. EMI from the MFCS shall not degrade other equipment.

3.6.18 Electromagnetic Pulse (EMP). High-altitude EMP shall not degrade the MFCS.

3.6.19 Lightning Effects (LE). Near strike lightning shall not degrade the MFCS.

#### 4.0 Verification

4.1 Methods of verification. Methods utilized to accomplish verification include:

a. Analysis. An element of verification that utilizes established technical or mathematical models or simulations, algorithms, charts, graphs, circuit diagrams, or other scientific principles and procedures to provide evidence that stated requirements were met.

b. Demonstration. An element of verification which generally denotes the actual operation, adjustment, or re-configuration of items to provide evidence that the designed functions were accomplished under specific scenarios. The items may be instrumented and quantitative limits of performance monitored.

c. Examination. An element of verification and inspection consisting of investigation, without the use of special laboratory appliances or procedures, of items to determine conformance to those specified requirements which can be determined by such investigations. Examination is generally nondestructive and typically includes the use of sight, hearing, smell, touch, and taste; simple

physical manipulation; mechanical and electrical gauging and measurement; and other forms of investigation.

d. Test. An element of verification and inspection which generally denotes the determination, by technical means, of the properties or elements of items, including functional operation, and involves the application of established scientific principles and procedures.

4.2 Classification of Verifications. The classification of verification requirements are:

- a. Production Qualification Test/Operational Test (PQT/OT).
- b. First Article Test (FAT).
- c. Conformance Acceptance Test (CAT).

Failure of any assembly, device, component, or test specimen to meet any of the requirements is cause for rejection. The Government reserves the right to terminate verification upon any failure to meet any of the requirements.

4.3 Verifications. Test samples may undergo to any or all of the tests listed in Table II and verified for compliance with any or all of the requirements of the MFCS Performance Specification.

4.4 Basis for Acceptance. Test samples shall meet all test and verification criteria.

Table II: Requirement Verification Cross-reference Table

Method of Verification

A-Analysis

D-Demonstration

E-Examination

T-Test

Requirement	Title	A	D	E	T	PQT/OT	FAT	CAT
3.3.1	Devices							
3.3.1.1	Pointing Device							
3.3.1.2	Commander's Interface							
3.3.1.3	Driver's Display							
3.3.1.4	Gunner's Display							
3.3.1.5	Commander's Call							
3.3.2.1	MCCR General							
3.3.2.2	Software							
3.3.2.3	Operating System							

3.3.2.4	Hardware							
3.3.2.5	Interfaces							
3.3.3.1	Initialization							
3.3.3.2.1	Internal Power Source							
3.3.3.2.2	Vehicle Power							
3.3.3.3	Displays							
3.3.3.3.1	Commander's Display							
3.3.3.3.2	Gunner's Display							
3.3.3.3.3	Driver's Display							
3.3.3.4	Location and Navigation							
3.3.3.5.1	ATA Compliance							
3.3.3.5.2	MIL-STD-188-220A							
3.3.3.5.3	FA C2 Compatibility							
3.3.3.5.4	Appliqué Compatibility							
3.3.3.6.1	XM30							
3.3.3.6.2	Mortar Doctrine							
3.3.3.6.3	Six Targets							
3.3.3.6.4	Six Autonomous Guns							
3.3.3.6.5	All Weather							
3.3.3.6.6	Perform While Moving							
3.3.3.6.7	Crew Protection							
3.3.3.6.8	Concurrent Manual FC							
3.3.3.7.1	Display SA							
3.3.3.7.2	Update Location							
3.3.3.7.3	Fratricide Avoidance							
3.3.3.8.1	Tactical FC							
3.3.3.8.2	Store 3 Fire Plan							
3.3.3.8.3	Process 6 Fire Missions							
3.3.3.8.4	Fratricide Avoidance							
3.3.3.8.5	10 sec Weapon Call for Fire							
3.3.3.8.6	Redundancy Avoidance							
3.3.3.8.7	Operational Status							
3.3.3.8.8	Ammunition Status							
3.3.3.8.9	Automated Resupply							
3.3.3.8.10	Event Log							
3.3.3.8.11	Clear System Data							
3.3.3.9.1	Technical FC							
3.3.3.9.2	Ballistic Solution							
3.3.3.9.3	Fratricide Avoidance							
3.3.3.9.4	FDC 10 sec Solution							
3.3.3.9.5	Gun 10 sec Solution							
3.3.3.9.6	Time Synchronization							

3.3.3.9.7	MET Data							
3.3.3.10.1.1	2 sec Rough Lay							
3.3.3.10.1.2	20 mil Rough Lay							
3.3.3.10.2.1	3 mil Precision Lay							
3.3.3.10.2.2	Adjustment Display							
3.3.3.10.2.3	Backup Display							
3.3.3.10.2.4	Display Refresh Rate							
3.3.3.10.3	Carrier Mounted Operations							
3.3.3.10.4	Ground Mounted Operations							
3.3.3.11	Lateral Backup							
3.3.3.12.1	Digital Mapping							
3.3.3.12.2	Printer							
3.3.3.12.3	Commander's Call							
3.3.3.12.4	Retransmission							
3.3.3.12.5	Inductive Fuze Setter							
3.4.1	Radio Interface							
3.4.2	Connector Protection							
3.4.3	Weight							
3.4.4	Mounting							
3.4.5	Cables							
3.4.6	Display Visibility							
3.4.7	Camouflage							
3.5.1	Reliability							
3.5.2	Maintainability							
3.5.2.1	Tools							
3.5.2.2	Support Equipment							
3.5.2.3	BIT/BITE							
3.5.2.4	Finish							
3.5.3.1	Manpower							
3.5.3.2	Personnel							
3.5.3.3	Human Factors							
3.5.3.4	Training							
3.5.3.5	Safety							
3.5.3.6	Health Hazards							
3.5.3.7.1	Counterfire							
3.5.3.7.2	Fratricide							
3.5.3.7.3	Detection							
3.5.3.7.4	NBC							
3.5.4.1	Transportability							
3.5.4.2	Air Drop							
3.6.1	High Temperature							

3.6.2	Low Temperature							
3.6.3	Thermal Shock							
3.6.4	Solar Radiation							
3.6.5	Humidity							
3.6.6	Shock							
3.6.7	Vibration							
3.6.8	Altitude							
3.6.9	Rain							
3.6.10	Salt Fog							
3.6.11	Sand							
3.6.12	Dust							
3.6.13	Fungus							
3.6.14	E3							
3.6.15	ESD							
3.6.16	EMRO							
3.6.17	EMI/EMC							
3.6.18	EMP							
3.6.19	LE							

5.0 Packaging. For acquisition purposes, the contract or order shall specify packaging requirements. When DOD personnel perform material packaging, those personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. The Inventory Control Point packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command, maintains packaging requirements. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.





**APPENDIX G**  
**PRF SPEC WRITING GUIDELINES & REVIEW CHECKLIST**  
OR  
***“HOW’RE YA GONNA KNOW IF YOU DID A GOOD JOB?”***

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**GENERAL:**

1. Use effective writing style and techniques.
2. Avoid passive voice and other verbosity.
3. Ensure clear, concise, and “crisp” communications.
4. Exclude unrelated business, financial, and management information (except as appropriate in Section 6) i.e., SOW tasks, data requests or rights, schedules (meeting, test, or delivery), financial (cost or price) references, certifications, test reporting, quality systems, or material dispositions, warranty provisions, legal issues, security provisions, or managerial responsibilities, duties, or obligations.
5. “Tailor” (extract and reduce) “outside” or tiered reference material into independent statements and insert at appropriate locations to avoid future “entanglements” if the original source material changes.
6. Base performance specification requirements on objective or quantifiable characteristics to avoid proposal evaluation and contract enforcement problems.

**SECTION 1:**

1. Include a short, concise description of the product covered by the spec.
2. Stratify product requirements related to unique user, location, configuration, etc. by Type/Grade/Class, if possible and appropriate.

**SECTION 2:**

1. Do not refer to MIL-SPECs/STDs, FED-SPECs/STDs. or DOD or Service management directives, regulations, instructions, or technical or training manuals.
2. Minimize drawing package (DDR) references to only those single drawings that would best convey identified critical or essential form, fit, function (F<sup>3</sup>) interface or interchangeability characteristics.
3. Minimize direct reference to non-government standards (NGS) and other tiered documents to “isolate” the spec from “outside” management change impact and influence.

**SECTION 3:**

1. State requirements in “user” performance, operational, and functional needs plus those tied to F<sup>3</sup> input, interface, support and ownership, and environmental conditions.
2. Do not state “user” needs or performance requirements in characteristics of presupposed point solutions or shortfalls of existing systems.

3. Do not indicate specific design solutions (except interface and interchangeability, as previously indicated).
4. Do not designate specific materials (unless ABSOLUTELY essential to performance).
5. Do not designate specific manufacturing processes, methods, or techniques.
6. Do not state requirements in terms of verification or test criteria (appropriate for Section 4). REMEMBER: Performance SPECs reflect an outgrowth of “user” (mission) needs. Engineering performance IS NOT NECESSARILY SYNONYMOUS with those “user” needs.

#### **SECTION 4:**

1. Eliminate Acceptable Quality Levels (AQL) and Lot Tolerant Percent Defective (LTPD) or any language that causes their inference, such as stating a set sample size and some number of acceptable nonconformances.
2. Eliminate extraneous “quality system” management statements about responsibility for inspection and compliance, facilities, or equipment.
3. Eliminate references to ‘Major’ and “Minor” nonconformances. In performance specs, the requirement is either met and verified = acceptable, or not met and not verified = not acceptable (i.e., accept on zero, reject on one, of any of the requirements set stated in Section 3).
4. (For component specifications) Ensure a verification in Section 4 for every requirement stated in Section 3. (For program-unique specifications) Ensure a relationship matrix in Section 4 identifies some nominal type of verification expected for every requirement in Section 3
5. Use techniques such as tables, matrices, or “matching” numerical relationships and the same paragraph titles between Section 3 and Section 4 (as appropriate) to clearly communicate the ‘one requirement/one verification’ concept.
6. Eliminate all packaging inspection or verification statements unless the issue is so intrinsic to the performance of the product that such a requirement is appropriate in Section 3.

#### **SECTION 5:**

1. Use only the mandated Section 5 paragraph as stated in MIL-STD-961D.

#### **SECTION 6:**

1. Include a short, concise statement of the product’s intended use, particularly relating to other systems, equipment or components.
2. Avoid introducing additional requirements.
3. Keep use of definitions and key word references to the truly essential or unique, not otherwise intuitively obvious in the spec title, scope, or requirements sections.

## GLOSSARY

ABC	Activity-Based Costing
ACAT	Acquisition Category
AICIM	Acquisition Integration CIM
AMC	U.S. Army Materiel Command
ANSI	American National Standards Institute
APCIM	Acquisition Process CIM
APU	Auxiliary Power Unit
AQL	Acceptable Quality Level
CDRL	Contract Data Requirements List
CEP	Circular Error, Probable
CI	Configuration Item
CID	Commercial Item Description
CIM	Corporate Information Office
CLS	Contractor Logistic Support
CM	Configuration Management
COC	Certificate of Conformance
CPAF	Cost Plus Award Fee
CPFF	Cost Plus Fixed Fee
CPIF	Cost Plus Incentive Fee
DCMC	Defense Contract Management Command
DIS	Distributed Interactive Simulation
DLA	Defense Logistics Agency
DOD	Department of Defense
DODI	Department of Defense Instruction
DODISS	Department of Defense Index of Specifications and Standards
DOE	Design of Experiments
ECP	Engineering Change Proposal
FAR	Federal Acquisition Regulations
FAT	First Article Test
FCA	Functional Configuration Audit
FMECA	Failure Mode Effect and Capability Analysis
GFE	Government Furnished Equipment
IC	Integrated Circuit
ILS	Integrated Logistics Support
IPD	Integrated Product Development
IPT	Integrated Product Team
ISO	International Standards Organization
JROC	Joint Required Operational Capability
JSOR	Joint Statement of Operational Requirements
LORA	Level of Repair Analysis
LSA	Logistics Support Analysis

LTPD	Lot Tolerance Percent Defective
MANPRINT	Manpower and Personnel Integration
MDA	Milestone Decision Authority
MIL-SPEC	Military Specification
MIL-STD	Military Standard
MIS	Management Information System
MNS	Materiel Need Statement
MRE	Meals-ready-to-eat
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
MWRH	Mounted Water Ration Heater
NBC	Nuclear, Biological, Chemical
NGS	Nongovernment Standards
NPR	National Performance Review
OFPP	Office of Federal Procurement Policy
OMB	Office of Management and Budget
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
PAT	Process Action Team
PBSC	Performance-Based Service Contract
PCA	Physical Configuration Audit
PEO	Program Executive Officer
PM	Program Manager
PWS	Performance Work Statement
QA	Quality Assurance
QASP	Quality Assurance Surveillance Plan
QFD	Quality Functional Deployment
QML	Qualified Manufacturers List
QPL	Qualified Products List
RAM	Reliability/Availability/Maintainability
RFP	Request For Proposal
SOW	Statement of Work
TDP	Technical Data Package